Annual

Review and Forecast

Number

Textile World

VOL. 87, NO. 3 ESTABLISHED 1868

February 28, 1937

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TEXTILE WORLD

Member of Audit Bureau of Circulations
Member of Associated Business Papers, Inc.

(Formerly *Textile World Journal*) with which are combined *Textiles*, *Posselt's Textile Journal* and *Textile Advance News*. Published monthly, United States and Possessions, and Canada, $3 per year; all other countries, $5, U. S. currency or 20 shillings. Price of this issue, $1.00.

Of this issue 13,384 copies were printed.

Contents copyrighted, 1937, by McGraw-Hill Publishing Co., Inc.

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12 MORE MONEY-SAVING Stainless ENDURO JIGS

After four months' experience dyeing silks and rayons in these 12 jigs made from stainless ENDURO*, this Pennsylvania dyehouse reports: "Our cleaning time for color changes has been cut to less than 10 minutes. Expensive bleaching agents are saved. More batches per day are obtained in each machine. Spotted goods and redye costs have been banished. Idle equipment has been eliminated." Briefly, this dyehouse, as well as dyehouses everywhere, are installing equipment made from this perfected stainless steel *because it saves them real money.* You should get all the facts. They can be secured by writing Department TW.

*Reg. U. S. Pat. Off.

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ANNUAL REVIEW AND FORECAST NUMBER

Textile World

Editor: DOUGLAS G. WOOLF

February 28, 1937

Question . . . and Answer

WE have tried honestly to find the answer. Here is the setting: A basic industry making money—by and large—for the first time in 15 years, with certain freak exceptions. Naturally, we were curious to know

What must the textile industry do to preserve the new profit era?

So we sent that question out to some 200 textile men—picked as a sample. We got over 25% response—which is pretty good for an academic question of that sort.

We have read and re-read the answers. We have analyzed them, and classified them, and published them. (See page 102 of this issue.)

Some say merchandising. Some say research. Some say elbow-grease. But the great majority say the same thing we have been saying over and over in these columns for years.

What do they say?

Answer: Control production.

Next question: How?

Answer: First, by putting a floor under wages and a ceiling over employee-hours. Next, by restricting machine hours.

MANY will not like this answer—particularly the last part. Frankly, we don't. We wish we could go back to free competition and run our machines as much as we want to—and beat the next guy.

But the next guy may be one who will raise us on hours and lower us on wages. In other words, it's not even straight poker. It's poker with the deuces wild. And we don't mind that as a game, but we definitely dislike it as a way of making a living.

So, what to do about it?

The textile industry has found what to do about it. By individual voluntary maintenance of code standards, commencing immediately after the Supreme Court's decision in May 1935, it not only aroused the admiration and envy of other industries, but prepared the way for the present profitable era. That was the textile industry's greatest accomplishment—and it is now reaping its reward. Manufacturers acquired a new sense of confidence; customers acquired a new sense of respect.

Naturally, as a reporter we would have liked to have found a new and novel answer to the question we posed. But, as an editor, we were glad we found an echo of our own sentiments.

Out of the chorus of replies we get mainly this refrain:

"Keep the 40-hour week; hold wages up; avoid the third shift."

After that, of course, there is an infinite number of ways by which the individual manufacturer can "beat the next guy": by advertising, by efficiency, by modernization, by research. *But,* practically all agree, no one can beat anyone else—and all can get beaten—if there is not a sound basis of wages, hours and production schedules.

FORTUNATELY, as we said before, the textile industry has made a marvelous start on this job. It has two glorious years of self-restraint to its credit. All it needs now to make this status permanent, is *some* Federal support. Not an Ellenbogen or a Mahoney Bill; not—in our opinion—the proposed Supreme Court change; but possibly an anti-trust law amplification with Federal Trade Commission backing—and accompanied eventually by a Constitutional amendment, if that proves necessary.

That, we believe, is the best answer to the hopes expressed by our readers in this issue.

Douglas G. Woolf

The Industry Speaks . . .

Our readers tell what must be done to preserve new profit era in textiles

NOT out of idle curiosity—nor because we feel an annual obligation to make a nuisance of ourself—*but because we really wanted to know,* we asked a number of men in the industry for their opinions on the following subject:

"What the textile industry must do to preserve the new profit era."

Many were gun-shy; this number was greater than it has been on other occasions when we asked some such simple question as "How's business going to be this year?" But those who *did* answer gave evidence of having devoted a great deal of thought to the question.

Personally, we got a great kick out of these letters—and we hope our readers do too. Anyone who says there aren't any brains in the textile industry has us to reckon with.—*Editor.*

★ ★ ★

Watch Supply-Demand Balance

By **JOHNFRITZ ACHELIS,** *President, Commercial Factors Corp., New York*

I THINK IT IS quite obvious that what the textile business needs to preserve the new profit era is a close study of the ancient economic law of supply and demand. The production at present is speeded up to fill a vacuum that has long been growing. When, however, this is filled, unless very close attention is paid to the possible normal consumption there will surely be an over-production with the resulting distress to the textile business.

★

Production Control the Real Secret

By **R. W. ARRINGTON,** *Vice-President, Union Bleachery, Greenville, S. C.*

OUR BUSINESS, that of cotton piece goods finishing, is, in a sense, a specialized business. The answer to your question in our particular branch of the industry would be hard to make in a brief statement. Almost every individual plant has different problems and would answer your question in a different way.

As far as the textile industry as a whole is concerned my opinion is that the industry must properly control production in order to preserve the new profit era.

There is absolutely nothing new in this statement but, even though old, it represents the real secret of profitable operation.

While there is doubtless a substantial pent-up demand from the depression years still needing to be satisfied, there is, on the other hand, great danger of glutting the market by increased operation of existing successfully-run plants and by additional production made available by the starting up of many marginal plants.

★

Sell Goods at a Profit

By **ARTHUR BESSE,** *President, National Association of Wool Mfrs., New York*

THE SUGGESTION that we have arrived at "a new profit era" smacks too much of the "new economic theory" of which we heard so much in 1929. I cannot see that we have arrived at any new era unless it be one of government spending—that promising to be the most permanent part of the New Deal.

The road to profits is simple to indicate but hard to follow. It is merely to "sell goods at a profit." I am not being facetious. The difficulty comes in the fact that costs vary so greatly with differences in the degree of activity at which a mill may operate. Sellers, however, often pay a ridiculous price in the endeavor to get this volume instead of basing their figures on a prudent estimate of what might be their expected share of the business available.

When one seller lowers his price to get a volume of business the market generally meets him promptly so that all he has done is to establish a lower price level for everybody, himself included. The manufacturer who believes that he is obliged to "guess" his cost because he does not know his probable volume should remember that his last chance to guess is *before* he sets his prices. Profits are made or are foregone when goods are sold.

★

Federal Legislation Essential

By **HYMAN L. BATTLE,** *Treasurer and Manager, Rocky Mount (N.C.) Mills*

THE NEW PROFIT era in the textile industry can only be preserved by Federal legislation establishing a maximum work week and a nation-wide minimum weekly pay. No industry can succeed by lengthening the work week whenever the demand picks up or by drastically reducing wages when the demand slackens.

That tendency on the part of the minority must be curbed or we will surely get back to long hours, cheap wages and no profits.

Our industry is composed of so many units and so many different viewpoints that we will never successfully cooperate, and while legislation of this type has its disadvantages they do not offset the good that will surely come from it to our stockholders, ourselves and our employees.

I believe we should lend our best efforts towards finding some way to have the necessary Federal legislation enacted as promptly as possible.

Sell First; Then Produce

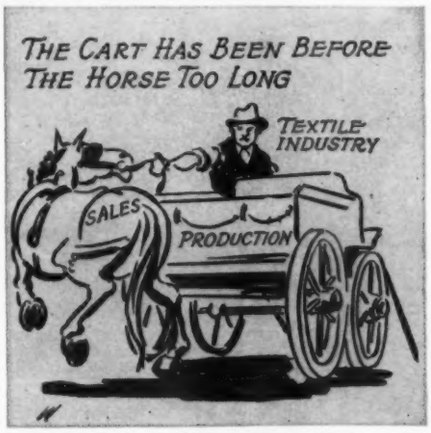
By W. RAY BELL, *President, The Association of Cotton Textile Merchants of New York*

THE DISTINGUISHING characteristic of the 1936 cotton goods market was the priority assumed by distribution and consumptive requirements. Increased production followed market activity, in response to broadening sales. The depression experience usually had this in reverse, requiring goods to be sold after they had been made. Even moderate inventories in those years exerted an influence against profits, and lower prices only promoted the widespread adoption of hand-to-mouth buying policies in consuming trades. During recent months, absence of mill stocks and the premiums commanded by nearby production have encouraged an exceptional volume of forward buying against future requirements.

Undermining of established values through an excess of production is the quickest method to force a resumption of hand-to-mouth buying on our customers. It can be largely avoided if each unit in the industry practices religiously the two policies of—

1. No sales for future deliveries without reasonable profit margin.
2. No stock accumulations beyond an adequate working inventory.

With the establishment of these principles there should be increasing study of markets, with all their potentialities and limitations, to the end that production will follow sales and not precede them. The soundness of these practices has already been tested to advantage by successful organizations. Should they become general, large benefits would be shared by all producers and distributors in our markets.



★

Prepare Now for Next Slump

By C. H. CLARK, *Secretary, United States Institute for Textile Research, Boston, Mass.*

TO MAINTAIN BUSINESS upon a profitable basis we must expend a generous percentage of current profits as insurance against the next inevitable depression. The tax on surplus profits has obliged us to reverse Andrew Carnegie's shrewd policy of preparing during depressions for periods of prosperity. Manufacturers and merchants must start now to prepare for the next slump in business, even though by so doing they may lose the final bulge of the present boom in demand and prices.

Obsolete mills and equipment must be revamped to the peak of modern efficiency, or new mills built. Manufacturers and merchants must co-operate in surveying and planning more efficient sales methods, based when possible upon new products, finishes, etc. The results of such effort, like those of scientific and economic research, are of greatest service in times of depression. We are not magicians and we can't pull these results out of a hat on short notice. In times of prosperity we must prepare for depressions.

★

Policies for Protection

By EARL CONSTANTINE, *Managing Director, National Association of Hosiery Manufacturers, New York*

I ASSUME THAT by "new profit era" is meant the business recovery which is now in process, and which is restoring many units in the industry to a profitable condition after several years of loss during the recent depression.

I suggest that the following policies would conduce to protecting the recovery which we are now experiencing:

First: Generally speaking, during the

A WORD TO OUR CUSTOMERS— *from the Editor*

Here is the pattern of this issue:

1. **Editorial Section (pages 101 to 120.)**
2. **Precision Section (pages 121 to 136.)**
3. **Digest Section (pages 141 to 168.)**

1. **The *Editorial Section*** presents a broad picture of the textile industry as of the first of 1937; a statistical summary; a story on mill expansion and modernization; a survey of textile machinery sales; an interpretation of imports—especially from Japan; a trend-study of textile securities; and—last but not least—opinions from a representative group of TEXTILE WORLD'S readers.
2. **The *Precision Section*** applies to every phase of textile management Robert West's challenging statement that the successful operation of textile mills is becoming a business of precision.
3. Finally, **the *Digest Section*** takes up each branch of the industry and analyzes its economic and technical progress, in addition to presenting practical helps for operating executives in each of those divisions.

Thus the main issue is three-in-one, while the third section is seven-in-one. That's what is known as giving good measure.

years of recent depression our managements eliminated wasteful practices and expenditures, and improved their efficiency. These gains must be retained.

Second: In the textile industry in particular, the volume produced reflects the volume sold. There is room for improvement in merchandising methods, in better styling, and in specialization.

Third: Prices should reflect reasonable profit, and fluctuate with costs of manufacture. To permit such prices, stocks manufactured not against orders should be held down to a reasonable point.

Fourth: Industry-wide studies and planning are increasingly essential. Sound broad policies should be developed dealing with production, merchandising and labor, and these should be generally applied under the leadership set up within each industry.

★

Avoid the Third Shift!

By GOLDTHWAITE H. DORR,
Chairman of the Board, Cotton-Textile Institute, New York

OUR PRESENT DEMAND in most branches of cotton textiles has now reached substantially the level that was contemplated when the code organized the operations of the industry on a two 40-hr. shift basis in an effort to bring the capacity of the industry into reasonable balance with consumptive demand. The industry is now reaping the reward for very generally having observed that basis of operation since the code went out. If the mills generally were now organized on a three or two 55-hr. shift basis, if experience counts for anything, we would now, by reason of this over-capacity, be satisfying this increased demand at cost or below. Obviously we should be active in preserving and increasing the demand. Obviously also we should not be tempted to disorganize the market by any general change in our organization for operation that will again automatically produce over-capacity. That would be against the best interests of employers, employees and consumers alike.

It is sometimes thought that uniformity of hours and wages would of itself protect against the disastrous price effects of over-capacity. Experience in England in textiles and coal where wages and hours have long been so stabilized, demonstrated that they will not afford this protection. Other measures have had to be resorted to and have been found useful. Experience in our own coal industry indicates the same truth.

This emphasizes the importance of the continued avoidance of the third shift which was abandoned under the former code.

Old-Fashioned Virtue: Self-Control

By FESSENDEN S. BLANCHARD,
Pacific Mills, New York

IF THE TEXTILE INDUSTRY is to "preserve the new profit era," it will need a good deal of the old-fashioned virtue of self-control. Its opportunistic tendencies will have to be replaced by a long-run viewpoint. There are and will be great temptations to run "hell bent for election," to stretch hours of operation and capacity beyond long-run requirements, to forego a long-run hope of prosperity in pursuit of immediate advantage—real or apparent.

The textile industry can develop, as individual companies or as a group, the same self-control in handling prosperity that it showed in meeting adversity. It will thus demonstrate its capacity for self-government. Otherwise the inevitable breaking down of standards will lead to the inevitable result: appeals for help followed by government controls and legislative restrictions which will cause many to wish that the NRA, with all its weaknesses, were here again.

★

New Fabric Possibilities

By CHAS. WHITNEY DALL,
President, National Rayon Weavers Association, Inc., New York

"WHAT THE TEXTILE INDUSTRY must do to preserve the new profit era" in a sense does not apply to the rayon weaving industry. This industry, since 1927, has had its bad and its good times, based on changing market conditions, but, as you know, has expanded during the depression years.

While the steady increase in production and consumption of cloth has been little short of remarkable and is attributable to modern research in science, as well as to the pertinacity of mill executives, I believe that there are possibilities of fabrics made from rayon yarn which have not yet been explored fully. For example, there was a tremendous increase in 1936 in fabrics made from spun rayon, but a much greater volume of such cloth is ahead.

The prospects for the year 1937 are for an increase in consumer demand. In face of this, there is little or no prospect of materially increased supplies of yarn. It will be 1938 before there is production available to the manufacturers from new plant construction. The year may well prove to be one of steady business on the better known fabrics, with the experiments on new cloths continuing quietly so that they may be launched on the market when larger supplies of yarn are available.

★

Must Control Production

By A. H. CARR, *President, Durham (N.C.) Hosiery Mills*

BY SOME MANNER or means the textile industry has got to control its production. It seems to me that if operations are continued through 1937 at the very high rate of today and last fall we will, inevitably, see a softening of prices. If the industry could be stabilized to the point where it would produce only against actual orders, such orders taken on the basis of at least a slight profit, then we could preserve this "new profit era."

★

Even Greater Cooperation Needed

By JOHN E. EDGERTON,
President, Southern States Industrial Council, Nashville, Tenn.

NEVER BEFORE in its history has the textile industry looked toward a more profitable and productive period than it now faces.

As perhaps no other industrial group, the textile industry has through voluntary cooperative agreement maintained more nearly uniform wages and hours than any other industry, and the wages of textile workers in the South have been increased more proportionately than have wages in any other industry.

To preserve this new era of prosperity for one of the nation's most important industries, there will be need for even greater cooperation between the industry and its trade associations. More research, and a continued study of the problems which face the industry should be stressed, to work out remedies for every problem. In this connection, the industry should consider carefully the present trend toward three shifts a day, for if overproduction results, inevitably a breakdown in price must occur. However, I feel certain

that this industry, which has a better grasp of its problems than perhaps any other industry in the country, will be amply able to cope with such a possibility, and will push forward to even greater prosperity.

★

Solve Production Control

By RUSSELL T. FISHER,
President, The National Association of Cotton Manufacturers, Boston, Mass.

TO PRESERVE the new profit era, or more correctly speaking to preserve the reestablished profitable condition of the market, the cotton textile industry must face and solve the problem of control of production. It must be prepared to curtail drastically, if necessary, before and not after over-production becomes a fact.

Both the amount of cotton consumed and the spindle hours operated show 1936 to have closed with a high level of operation that cannot be maintained.

Those in the industry who are seeking temporary advantage through third-shift operation, or by a longer work week than 40 hours, are jeopardizing the profits of all manufacturers including themselves. Unless the industry is prepared to cut production promptly when the present bulge in the market starts to recede, then profits will dwindle or cease. If third-shift operation is to be the accepted basis, then we must face the long drawn out and painful period necessary to liquidate equipment down to a production-consumption balance. Those who have gone through the trial of liquidating the industry from a single shift to a two-shift basis, cannot look forward to another such period with anything but dread.

★

Research on Consumer Demand

By STANLEY B. HUNT,
Textile Economics Bureau, Inc., New York

PROFIT MEASURES the difference between selling price and cost. Costs of textile products are rising. Selling price, on the other hand, is determined by such factors as supply, demand, substitution, etc. Looked at from this angle, I think that the "new profit era" already is on its way out due to the excesses of supply of goods created in the past six months, especially in cotton goods. Supply simply has far outrun demand at "new profit era" prices.

A *really new* profit era could be created by balancing supply with demand at a given price. Our textile industry is quite well informed on supply in the primary producing markets; but our real knowledge of consumer demand at given price levels is woefully inadequate or even non-existent.

Real research on consumer demand is required. Not necessarily the day-to-day type of study which would tell the producer whether to weave or not to weave a certain order of goods—but rather a comprehensive, medium-term set of yard-sticks of consumer demand. Given facts, the textile executive can so order his business as to show a profit. But today he is too often influenced by a primary market price psychology to overproduce and then ruin the price structure not only of his own concern but also that of his industry.

We must have more knowledge of the textile consumer before *any* profits, be they the new era or the old era type, can be realized.

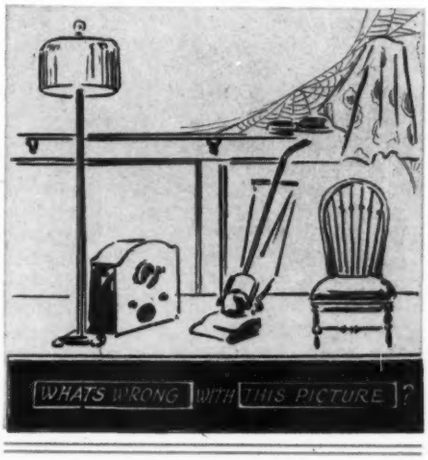
★

Advertise to the Consumer

By THURMOND CHATHAM,
President, Chatham Mfg. Co., Winston-Salem, N. C.

I FEEL THAT, owing to custom and to the set-up in the textile industry, we have not been particularly wise or forward-looking in merchandising generally. Our productive facilities have been kept modern, but our merchandising policies, with few exceptions, have been among the most backward of any industry.

To maintain a profitable era in textiles I think it is absolutely necessary that we follow the lead of such industries as the motor-car industry and, through advertising, make our products better known to the buying public of this country. Anyone who glances through our national magazines and newspapers, or listens to the radio programs will find the textile industry sadly lacking in reputation. I do not consider competition between ourselves to be nearly as severe as competition with other industries who are after the consumer dollar. A woman who has a certain amount of money to spend may buy a new lamp, new curtains, blankets, something for the kitchen, or one of the products of dozens of various industries. The merchandise that is placed before her in the most favorable position will probably get the call.



★

"Remember What Made Him Sick"

By R. D. HALL, *President, Southern Combed Yarn Spinners Association, Gastonia, N. C.*

IF A MAN OVER-INDULGES himself he is sure to be sick. The same is true of an industry.

Between the years 1920 and 1929 the textile industry went on a production "bender." Plants were increased, new ones built, machinery speeded up and operating hours increased. The result—a very, very sick industry. After years of lingering illness, just when the doctors have pronounced the case hopeless, the patient begins to recover without so much as an operation.

Through an enforced diet he has lost weight to the extent of 10,000,000 spindles. Through regulation of his own habits, his high blood pressure—caused by excessive stocks—has been reduced; internal friction—causing abnormal temperature—has been eliminated, and the patient is feeling very much better indeed. If only he can remember what made him sick, he will stay well.

★

Modernization and Merchandising

By WM. P. JACOBS, *Secretary-Treasurer, Cotton Manufacturers Association of South Carolina, Clinton, S. C.*

IT SEEMS TO ME that there are only two methods by which the textile industry can preserve a profitable era. The first is in the installation of the most modern type of equipment, the adoption of the most scientific methods of production, looking toward a larger production of a better product, at a lower production cost.

The second method, which may perhaps be even more difficult, is found in the re-organization of the selling end of the textile business. If at all possible the textile industry must solve its problem by controlling its market.

Many steps have been suggested, looking in this direction, including the consolidation of selling agents, reporting of sales, an open-price market for textile products, and various other ideas, all of which no doubt have much merit, and some of which are already in effect, and are doing some good. The truth of the matter is, however, that the situation calls for the intro-

duction of improved merchandising methods.

I believe that some day the textile products which are largely sold by the mills today in the gray will ultimately be sold in more finished form, and the sales efforts, coupled with constructive publicity, will reach far beyond the present sphere.

★

Ask and Get Fair Market Value

By FLOYD W. JEFFERSON,
Iselin-Jefferson Co., New York

TO PRESERVE PROFITS, the textile industry must remain profit minded which means that fair market value for manufactured goods must be asked and obtained.

Fair market value does not mean extortion, it means just what the name implies,—a price that is fair to the buyer and that gives to the seller a reasonable and adequate return on capital investment, with proper compensation for the risks undertaken.

Prices pyramided to unfair peaks would eventually destroy the profit era almost as surely as ruthless competition.

Destructive price-cutting is seldom found in a market where the operations are principally in the nature of contracts for forward delivery. It manifests itself only when stocks begin to accumulate; therefore, to preserve profits, we must not make up large yardages without orders.

And finally mills and their agents must learn patience. Too often, after extreme activity, they attempt to force additional goods on a glutted market. To make and preserve profits, sell contracts when the trade wants to buy, not after requirements have been satisfied.

★

Low Cost; Low Selling-Price

By RALPH M. JONES, *President, Underwear Institute*

AN ERA OF SHIFTING values is always fraught with danger. The increase in wages that has accompanied increased volume in industry can have but one result: increased retail prices. The thing required for increased prosperity is for the people to be able to purchase more goods. The higher the prices the less chance there is for this to come to pass. Many people have had no increase in income. Millions are still unemployed. It seems to the writer, therefore, to be the duty of management in the textile industry:

1. To carefully study each item of cost.

2. To endeavor by efficiency, waste elimination, and other economies to produce as cheaply as possible.

3. Then to be satisfied with as moderate a mark-up for profit as is required to make a fair return on the investment.

In this way, only, can we hope to preserve our profit gains until more staple conditions arrive.

★

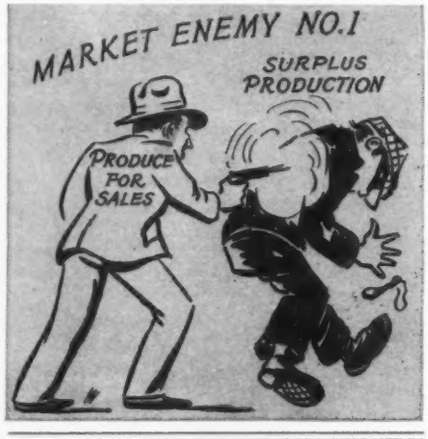
Market Enemy No. 1

By ROBERT GLASSFORD,
Bliss Fabyan & Co., Inc., New York

IT WOULD PROBABLY be possible to secure some hundreds of differing views as to the best way to keep the industry profitable. It seems reasonable to consider here one only and this from the negative rather than the positive side.

"What is it necessary *not* to do to preserve the new profit era?"

Of all the menaces to maintained



profit margins, market enemy No. 1 is inevitably the continued accumulation of surplus production. Surplus production is any production that is not needed or wanted at the time it is produced. The mere existence of unwanted surplus is dangerous. The forcing of it on an unwilling market is fatal. Contrary to some expressed opinion surplus capacity as such never actually broke down any sound profit structure. Fear of excess capacity is fear that the dam *may* break. Excess production is the flood after the dam has burst. Everybody runs.

When this truth becomes accepted by personal conviction and the flow of product is maintained in reasonable harmony with the sales and deliveries a good or bad market can assimilate, and unwanted goods are *not* made while they are unwanted, a long step toward the preservation of profit margins will have been taken.

Maybe some day the suggestion that 5,000 more distribution dollars per million be spent, calculated to secure a quarter of a cent a pound more profit, will get the same consideration that is given a proposal to spend 50,000 equipment dollars calculated to secure a quarter of a cent a pound lower cost.

★

Merchandise Properly

By COL. CHAS. F. H. JOHNSON,
President, Botany Worsted Mills, Passaic, N. J.

I SHALL SAY the thought I have in my mind as an answer to your question in perhaps a simple way:

"It must learn how to properly merchandise and cater to its market."

You realize, of course, when I say this I am not attempting to judge anything but the woolen and worsted end of the industry. I know nothing of the other branches, at least not sufficient to be in the position of either critic or mentor. I do feel, however, that in our own orbit the worsted and woolen industry is extremely able from the manufacturing standpoint and lacking terribly in its merchandising, and that may be due to the fact that so much of it is done through those who have no investment in plant facilities.

★

New and Improved Products

By J. SPENCER LOVE, *President, Burlington Mills, Greensboro, N. C.*

I CAN'T OFFER any *new* recommendations applicable to the immediate situation in the textile industry. The problems are the same as they have been and probably will continue. Through persistent research, experimentation and effort, the industry must continually give the public new and better quality products, and constantly improve values offered in the older ones. In this way the industry can keep itself in public favor and continue to obtain its share of the consumer's dollar; the better this job is done in any industry, the greater the profits.

It goes without saying that these newer products and better values must not be attained at the expense of labor. Industry cannot hope to progress further and profit unless it maintains and advances the steady improvement in social conditions which has kept pace with the growth of American industry.

★

A Broad-Gaged Program

By S. C. LAMPORT, *President, Lamport Mfg. Supply Co., New York*

IN ORDER TO PRESERVE the new profit era, the textile industry must adopt some form of self-discipline and production regulation that will be workable on a national scale.

1. There should be a fair allocation

of textile industrial activity both through the North and South so as to leave no necessity for emergency production schedules in any section of the country.

2. The textile industry should encourage the implementing of national legislation settling maximum hours and minimum wages that will be operative on a fair basis throughout the country, guarding at all times against industrial chiselers and exploiters of labor.

3. Manufacturers and commission men should guard carefully against making sales to irresponsible buyers who are likely to renege on contracts if the market breaks or dump an avalanche of second-hand goods on the market.

4. The industry should take due heed of the reciprocal trade agreements that are now being arranged by our State Department and see to it that the textile industry gets a fair break so as to enable us to regain some of our lost markets.

5. We must be more ingenious and more resourceful than ever before. Our equipment must be kept up to the very nth degree of fitness and efficiency. Our ingenuity and creativeness as to style and quality must be ever on the alert.

★

Three Things to Do

By K. P. LEWIS, *President-Treasurer, Erwin Cotton Mills Co., Durham, N. C.*

THERE ARE, in my opinion, three outstanding things that the textile industry should do to preserve an era of reasonable profits.

In the first place, mills must put far less emphasis in the future than they have in the past on the desirability of full operation. Should demand decrease for textile products, which inevitably must come sooner or later, the mills must commence curtailing before the warehouses of the industry are full of goods. In the past there has been too much disposition to run, and mills have forgotten the profits consideration in the slashing of prices.

In the second place, it seems to me of paramount importance that the mills stick to a two 40-hour shift operation. I do not know of anything that would more quickly bring chaotic conditions in the industry and probably hurtful legislation than a breaking away from this basis of operation.

In the third place, the cotton mills of the country should be fair to labor. Although the recent increases in wages considerably increased the cost of operation, in my opinion they were very much in order in the fair treatment of labor. Following the lead of most of the large mills in this movement, it would favorably impress the country generally and mean a great deal to the welfare of the textile industry if those mills which have not followed suit would fall in line, and if those mills who have increased the length of their work week would go back to the code standard in this respect.

Keep Prices Down!

By GROVER C. GOOD, *President, Globe Knitting Works, Grand Rapids, Mich.*

I BELIEVE WITH the Brookings Institute that one way to maintain an era profitable for business is to hold prices down as low as possible and to increase wages as much as possible at the same time in order to increase purchasing power. We are trying to be as conservative as possible in the raising of prices on our own products, but with the cost of raw materials going up and with labor costs increasing, it is very difficult to hold selling prices down. I think the urge to raise our selling prices, sometimes too rapidly, springs from the fear that rising labor costs and rising raw material costs will throw our business into the red.

At the same time, we know that when the prices go up too rapidly, there is very apt to be a reaction and the extent of the reaction has usually been measured by the extent of the rise. We feel therefore that, outside of the first essential of keeping our plant operating in the most efficient manner possible, a conservative attitude toward price advances will be most helpful over a term of years in maintaining business on a profitable basis.

IT'S A GOOD TRICK IF HE CAN DO IT

★

Broader Distribution, Not Scarcity

By JOHN A. LAW, *President, Saxon Mills, Spartanburg, S. C.*

I AM NO DISCIPLE of the gospel of scarcity, my belief being that *broader distribution* is the best means of preserving the new profit era.

So long as the most populous nations of the world are inadequately clad, and cotton cloths continue to be the most economical clothing in tropical climates, it cannot be truthfully claimed that there is overproduction.

The textile industry's greatest trouble is inadequate distribution, and whatever steps are necessary should be taken to supply the needs, and gain the benefit of making distribution in manufactured form.

★

Know Cost; Price Sensibly

By HAROLD R. LHOWE, *Executive Director, National Knitted Outerwear Association, New York*

WHAT THE TEXTILE INDUSTRY must do to preserve the new profit era is to make a profit. This is no tautological absurdity. All I mean is to emphasize the importance of proper cost studies and of adherence to their scientific conclusions once those conclusions are reached.

There is no special skill required to make a profit when the market is increasing, when new consuming power is being added regularly, and when the productive capacity of an industry is not equal to the demand made upon it. The challenging problem arises when, under other conditions, a manufacturer must measure his efforts and burdens carefully in order to ascertain his costs and then proceed, after analyzing his market, to capture and *confine* himself to the kind of business which will support the continuance of manufacture.

That is not to say that all the other usual caveats may go unheeded in preference to the admonitions of good cost and price sense. Of course, attention must be given to mill equipment. Of course, labor efficiency is important. Of course, all the other factors are to be accorded due weight. But in the textile industry, as I have viewed it from my vantage point, greater losses have been incurred through mad scrambling after volume with no attention to sensible pricing than through any other way.

★

A Six-Point Program

By W. M. McLAURINE, *Secretary, American Cotton Manufacturers Association, Charlotte, N. C.*

MY IDEAS of what the textile industry must do to preserve the new profit era are:

1. To remember that business runs in cycles. It always has and always will as long as man is limited in economic intelligence.

2. This means that there is a depression at the end of this prosperous period. The road sign of this period reads, "Watch the road, pavement ends—?"

3. This means, do not over-expand.

Do not over-produce. Stay in a controlled merchandising position.

4. Don't invite disaster and this can be done in two ways. First, as indicated in the above statement, don't gorge the market and push it, and don't let any group of selling agencies do it for you. Second, don't let industrial relations become contaminated, so that labor disturbances can be easily aroused. In short, stay in a defensible merchandising position and a defensible industrial relations position.

5. Sensible security with definite operating schedules with reasonable returns are much better than inflated schedules of production trying to beat some fearful monster of destruction, which is only invited to come faster by an abnormal program.

6. It requires more sense to handle prosperity than it does to handle a depression. A manufacturing program heavily shot through with broad economic knowledge will prolong the period.

★

Support a Fair Price

By E. J. McMILLAN, *President, Standard Knitting Mills, Inc., Knoxville, Tenn.*

IF A REASONABLE MARGIN of profit is to continue in the textile industry, production must be controlled to the extent that no more goods are produced than can be marketed at a fair price, all items of cost considered. The manufacturer must realize that operations cannot be always maintained at capacity. This fact must be considered in figuring cost: market demand must be constantly considered and in periods of slackened demand the market must not be forced. In such periods every effort should be made to support a fair price which will at least partly compensate for curtailed operations.

Forcing the market inevitably reduces the profit margin of all competing in that market and the building of the profit margin is a slow process. It is much easier to tear down than to build. Practice of fair competition and cooperative market support on the part of competitors is necessary if the textile industry is to continue to operate in black figures.

★

More Broad-Gaged Cooperation

By J. A. MILLER, *President, Exposition Cotton Mills, Atlanta, Ga.*

IN THE FIRST PLACE, on many classes of cotton cloths the margin of profit has not yet attained a figure that would justify any great excitement.

In the second place, if we expect to keep even the margin of profits which we now have, it will be necessary for mills to watch operations very carefully, so that there will be no over-production of cloth. For this reason, we think it would be well for the industry as a whole to adhere quite closely to the so-called "code hours and wages."

In the third place, with the great mass of legislation that is being offered in both Congress and State Legislatures (a considerable amount of which may be passed), which is not for the best interests of either cotton manufacturers or their employees, all of which is largely beyond the control of the industry, it does not now look as if the path of the cotton textile manufacturers for some time to come would be "strewn with roses."

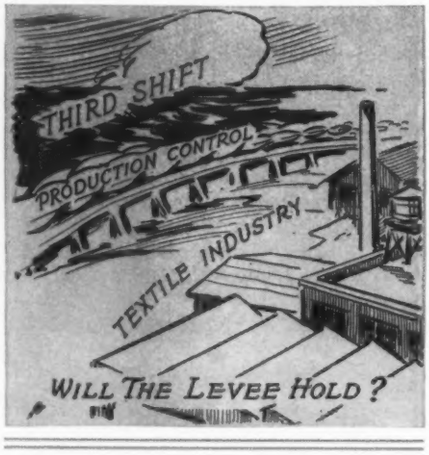
Therefore, we think it best to pursue from every angle a very conservative policy, hoping for the best, and not being disappointed if the returns on our investment are greatly curtailed in the not too distant future. We should have more broad-gaged cooperation among the individual units of the industry, considerably less selfishness, and a great deal more effort for the common welfare of the industry as a whole. This may be Utopian, but it does seem that the last seven or eight years should have taught us our lesson.

★

Third Shift the Threat

By HENRY P. KENDALL, *President, The Kendall Co., Boston, Mass.*

THE PRESENT TREND toward three-shift operations appears to me to be the threat. It seems as though the industry had not learned the lesson of the years of adversity when overproduction, long hours, low earnings, low prices and loss became characteristic year after year. The NRA and other factors helped to put cotton textiles on a high level, but even before the surge of speculative buying in the late summer and fall of 1936, longer hours and third-shift operations emerged. If the third-shift movement spreads, overproduction follows; goods will be sold at a loss again as soon as inventories are built up and other serious problems will be bred. Now would seem to be the time to recall the earlier workings of cause and effect, which wrought havoc in the pre-NRA days. The practice in certain other industries of handling such peaks as we have been experiencing, by an increase in hours of work, with overtime pay, may not fit our situation, but certainly this general type of emergency action should be given consideration.



★

Beneficent Mergers the Answer

By W. S. NICHOLSON, *Treasurer, Excelsior Mills, Union, S. C.*

YOU MUST HAVE been sitting up nights thinking up that question, "What the textile industry must do to preserve the new profit era," because it is certainly a tough one to answer.

Obviously supply must be adjusted to demand but how this is going to be accomplished after witnessing the divers efforts along this line in the last 10 years, I am unable to say. Voluntary curtailment is one thing, legislative restriction is another, and the survival of the fittest is still another, and all of these panaceas have many disadvantages.

I have felt that the only satisfactory way that the textile industry would be profitably preserved would be to lodge control in comparatively few but beneficent hands through mergers, and therefore management control. How this would be accomplished to the satisfaction of the numerous individualists in the industry is something else again. Stabilization corporations offer a faint glimmer of hope with perhaps fewer obstacles in the way of realization than some of the other theories that have been advanced.

I cannot help but feel that the survival theory has been slowly but effectively at work all of these recent years, and through the elimination of millions of spindles and looms, a foundation was laid for our present situation. If the present era continues long I believe many mills will gird their loins for the next depression by improving existing equipment to the last degree, rather than expanding the same.

★

"Just Don't Make Sense"

By J. J. PHOENIX, *President, Bradley Knitting Co., Delavan, Wis.*

THE TEXTILE INDUSTRY can establish and maintain profitable operations only on the basis of a fair wage commensurate with American standards of living, and a fair return on capital

investment commensurate with the hazards of the various branches of the textile industry; but only when our government cooperates to protect labor, management and capital from foreign exploitation.

The Federal Government is guilty of impairing profitable operation by aiding the movement for high wages and shorter hours of work while at the same time, through reciprocal trade agreements, encouraging imports from cruelly low wage countries. These contradictory policies "just don't make sense."

If trade barriers are to be lowered, either wages and workers' living standards must be reduced or textile plants ultimately shut down, workers thrown out of jobs, while Europe and Japan become the sources of America's textile supplies. Verily, the good neighbor policy evidenced in the trade treaties creates a grievous hazard which our workers and management are not responsible for but must suffer under.

★

Four Ways to Make It the Rule

By E. T. PICKARD, *Chief, Textile Division, Department of Commerce, Washington, D. C.*

IF A "PROFIT ERA" is to be the rule rather than the exception, there is need for:

1. A more penetrating knowledge of consumption demands and trends.
2. Rationalization of production and costs.
3. Less overselling on long forward commitments.
4. More statesmanship in the mills and in the markets.

★

Consumer Reaction the Crux

By MOSES PENDLETON, *President, American Woolen Co., Inc., New York*

TEXTILE MANUFACTURERS' profits are derived, obviously, from the advantageous purchasing of raw materials, the conversion of these materials into finished fabrics at a controlled cost, and, finally, the marketing of the products at prices which allow a reasonable margin over and above all rightly chargeable expense.

In our particular field the complicating factors are as follows:

1. The increase of 25% to 35% in fabric prices during the last half of 1936.
2. The increase of 10% in our employees' wages, and the new social security taxes.
3. The uncertainty as to consumer reaction to higher retail prices.

Of the above, only the last factor is a debatable one, and seems to me to be the crux of the situation.

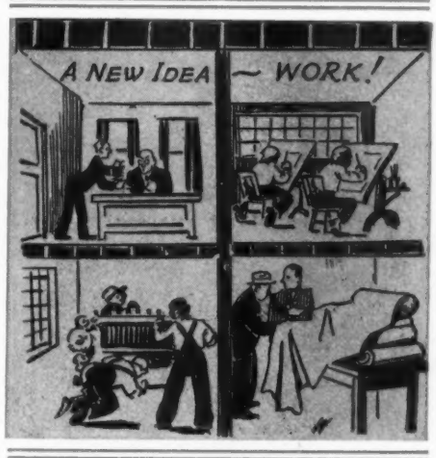
The expansion of consumer buying-power justifies a certain degree of optimism. Furthermore, there is good reason to believe that the retailers will continue to advance their prices gradually, thus reducing the consumer resistance.

★

An Answer in One Word

By LEAVELLE McCAMPBELL, *McCampbell & Co., Inc., New York*

I HAVE NO RECEIPT to "preserve the new profit era" except elbow-grease.



★

An Answer in Six Words

By S. A. SALVAGE, *The Viscose Co., New York*

THE SUBJECT "What the textile industry must do to preserve the new profit era" is a big one, but I do not feel I could extend it to the neighborhood of 150 words, as, to my mind, six words cover it—"Maintain confidence and do not speculate."

★

Self-Control and Vision Must Dominate

By SIDNEY H. SCHEUER, *Scheuer & Co., New York*

THE NEW PROFIT ERA in textiles has been exceptional in that almost all agencies within the industry have prospered. This is not normal. The inequalities in efficiency and ability which exist will become more important factors in 1937. Clearly profits will be less well spread.

The first essential to the continuance of the "new profit era" is that volume be maintained. High prices will not permit of this attainment. Price moderation and a reasonable degree of price stability are necessary.

Competition between the various agencies of production and distribution will have a more restricted field of profits to draw upon. The competition for a share of textile profits as between finished goods buyers and converters, finishers, and gray mills is certain to be more strenuous. Facing this prospect, wise plant modernization and warranted machinery replacements are important. Some expansion is desirable in those divisions of fabric manufacture where abandonment has been overdone. There are some classes of fabrics which are distinctly under-produced.

The new profit era will be best maintained if self control and vision dominate. Large profits are neither necessary nor desirable in an industry producing mass consumer products! Satisfactory profits are attainable, but only if a spirit of restraint dominates.

★

Must Continue to Modernize Machinery and Plants

By ALBERT L. SCOTT, *Lockwood Greene Engineers, Inc., New York*

IN ORDER TO PRESERVE the new profit era, the cotton textile industry must continue to modernize its machinery and plants so as to produce quality goods at low unit costs. This does not mean lower wages. Continued advances in textile machinery design and operation indicate that lower costs of product and higher wages are compatible. Manufacturers should see to it that labor receives a fair share of the savings in cost made possible by better machinery.

Despite the current tax laws, mills should not pay out dividends to the point of weakening their reserves. The industry should carry on a continuing study of markets at home and aboard and make constant attempts to extend its sales in other lands. This means that manufacturers should back Mr. Hull in his tariff policy and should realize, despite what appears to be their immediate interest, that the American tariff should be so arranged as to permit other countries to sell here in order to have the wherewithal to purchase from America.

★

Rational Production Program Will Sustain Prosperity

By H. NELSON SLATER, *President, Slater Co., Inc., Webster, Mass.*

THE PRESENT PERIOD of business activity which the textile industry is enjoying may be considered extraordinary insofar as the profit margins are concerned, for the following reasons,

which have created a strong sellers market:

1. Small stocks and great demand due to improved business confidence generally.
2. Rising prices and increased per capita buying power.
3. Renewed activity of heavy goods industries after five years of very slack business.
4. Better distribution of wealth and greatly increased farmer buying power.
5. Government expenditures for relief and recovery purposes.

Although part of the present demand is rapidly being filled there is good reason to believe that with a rational production program our industry should now prosper for a long time to come.

The terrific competition of the past 15 years has forced those who wished to remain in business to the highest manufacturing efficiency and quality of product. With the present low costs it is reasonable that this major industry, if reasonably managed, should be rewarded for the great efforts it has made to survive by having its share of good business.

★

New Fabrics the Answer

By A. M. TENNEY,
A. M. Tenney Associates, Inc., New York

AT LEAST FOR A YEAR ahead we can be assured that the textile industry will be the recipient of much of that extra purchasing power occasioned by the increased activity of all other industries and particularly the capital goods industry, which as the TEXTILE WORLD has pointed out was lacking in the previous boom in late 1933.

One can predict with certainty that a part of this new era of increased purchasing power will be profitable to the textile industry. However long or short it may be, the fabric manufacturers' share in this prosperity will be in direct proportion to their ability to create a continuously diversified line of new textiles, which will stimulate the desires of the public for new textures. To be mislead into a manufacturing simplification of fiber, fabric, garment or style—with a resultant attending overproduction because of the present initial scarcity of fabrics to meet the first textile wants of a large unsatisfied and increased population demand—is to take the short view, to sell our country short and obtain the profits of only the first and smallest part of the new textile era.

Excessive production schedules, even of three shifts, cannot be considered dangerous, if sufficient diversification is practiced in the kind of goods produced. The danger of overproduction in woven goods lies in the concentration of many mills on a few types of fabrics. The more different things made, the less of each type there is available. The more wants created, the more profitable the demand. Plant expansions for new uses can never be too many, and the raw material producer can never be wrong when his plant expansion keeps pace with the discovery of new uses for his product in other fields.

★

Emphasis on Credits

By J. FREDERICK TALCOTT,
President, James Talcott, Inc., New York

PROSPECTS FOR A continuation of the profitable state now being enjoyed by the textile industry are favorable. In many instances manufacturers have orders on hand for months in advance.

CAUGHT!

Rising costs of production will probably necessitate an advance in prices all along the line, with the consumer ultimately footing the bill. This increase should not prove a major obstacle to buying if the present rise of purchasing power continues.

Inherent in the above situation are the problems arising from credits. During this period, when supply is running behind demand, much attention is necessarily given to producing goods, with the consequence that too little attention may be paid to credits. Manufacturers too often contract heavy capital debts in order to take advantage of current market conditions. Inventories are built up and plants are expanded, and as buying resistance increases, credits are over-extended. When the inevitable readjustment comes, these manufacturers are caught between the twin grindstones of over-extended credits and restrictive obligations.

A close check on credits and a moderate policy in regard to expansion will, in most cases, well repay the manufacturer by assuring him of a profitable period of stable operations. To preserve the new profit era, there is, in my judgment, no infallible recipe. The answer, it would seem, lies more in the direction of conserving the resources of each individual manufacturer, with particular emphasis upon credits, than in that of a theoretical stimulus for the industry at large.

★

For 40-Hour Week and Minimum Wage

By HENRY J. TYNAN, *President, Throwsters Research Institute*

THE TEXTILE INDUSTRY—and every other industry—need more than anything else to get on the job of injecting into politics more of common sense, fair play, and fundamental honesty; for it has transpired that the fate alike of employers and their employees lies very largely in the arena of politics—and that the said arena has become populated preponderantly by the wrong sort of performers.

There are no substitutes for time and effort in any department; and industry will have to give just these things to its new department of politics. To do so is today both a patriotic and a business duty. Not to do so is to accept disaster without putting up a fight.

No part of which means opposition to the real best interests of industrial workers — who will eventually fare worse than any one else if free industry is not preserved. The welfare of industry and the welfare of its workers are inseparably linked.

The Institute, representing several hundred plants, favors a 40-hour week and reasonable minimum wages, to be established by inter-state compacts or other constitutional means—and to be adequately enforced. We believe these two things are good; and that they would establish a sound and free competition in which enterprise and good management would win the rewards—as they should.

★

Community Good-Will Essential

By HARRY C. WOLFENDEN,
R. Wolfenden & Sons, Attleboro, Mass.

WITH ALL THE TRAGEDY that New England has witnessed during the past six or seven years, vacant and demolished factories, etc., it has certainly been most gratifying to notice the large number of plants that have been put back on a dividend-paying basis; also the volume of business that has been booked for immediate delivery. Beyond all this there are a great many problems ahead for New England industries. We must watch carefully our foreign competition; distances are much shorter.

Our State and Federal Governments must wake up to the fact that it is about time industry had some consider-

ation, and our local communities should help promote good will towards our industries, which will automatically promote the best interests for all.

★

Make Our Businesses More Efficient

By J. A. ZEHNTBAUER, *President, Jantzen Knitting Mills, Portland, Ore.*

I BELIEVE a new profit era in the textile industry can best be preserved by the efforts of each individual unit of management in an endeavor to manufacture more efficiently, design more efficiently, advertise more efficiently and sell and distribute more efficiently, because we will then merit the sales we hope to make and which will make us prosperous.

There is so much room for improvement in each of these departments that special concentration upon improving our service to our customers by making our business more efficient will keep us prosperous, provided there is not too much political interference.

What's the Name, Please?

IN every symposium of this sort, there are a number of letters whose authors are too modest to permit quotation, but which contain thoughts worthy of a better fate than the waste-basket. Consequently, these have to be assigned to the "anonymous" category. We don't like it, but it's better than nothing. See below.—*Editor.*

Brief but to the Point

ANONYMOUS

1. Get rid of all selling agents whose personal incomes and fortunes are not affected by mill losses.
2. Get rid of all mill managers whose personal incomes and fortunes are not subject to mill losses.
3. Through adequate wages make a proper contribution to the purchasing power of the nation according to the standards of the year 1937.

★

Raise Wage Levels

ANONYMOUS

MAY I SAY, wholly personally, and not for any quotation, that I have thought a good deal about the question you propound. I think, in the first place, that we and other industries will help hold recovery over a period by reducing costs and prices on wanted merchandise, and at the same time improving our wage levels. I don't see how else to explain the amazing success of Mr. Ford and the Woolworth stores. Nor can I see any other solution to the challenge of an industrial age and mass production.

Now this seems to me to demand the fullest use of applied science in the laboratory, machine invention, merchandise research, better personnel in both executives and staff, and—perhaps most important of all—a fuller appreciation of the human qualities required in leadership, as expressed in employer-employee relations. It also seems to me that logical events will inevitably compel the manufacturers to insist that there be less waste in distribution, even if this calls for cooperation with new mechanisms in distribution.

I do not any longer believe that our salvation lies in production control. I think that the best equipped, most modern organizations should apply themselves to maximum production, and let obsolete machinery and chiseling management pass out of the picture.

★

For Survival of the Fittest

ANONYMOUS

THE MARKETING of our product is not one of my immediate problems, and I am not in close enough touch with the markets, the effect of foreign competition and other elements which enter into the merchandising of fabrics to justify any comment, at least on this phase of the subject.

My most reasonable observations, therefore, have to do principally with the need for lower cost of operation principally through the use of more modern equipment, better cost finding, better control of waste and utilization of power. From a long-range point of view this should result in the "survival of the fittest." While this would and probably will scrap a lot of obsolete equipment, it would at least stimulate a somewhat smaller group healthy enough to carry on without legislative restriction. Obviously, this idea is not a popular one, and is not for publication.

★

What? No Profits?

ANONYMOUS

THE SUBJECT is a most interesting one but I think it could be covered much better by the cotton and woolen people who have something to preserve.

I am afraid that from the rayon and silk weaving ends the subject might have to read somewhat differently and I believe that upon further consideration you will agree with me on that point.

★

"... and in Washington"

ANONYMOUS

I ADMIT THIS is a very interesting subject but I am strongly of the opinion that it is unwise for me, and I would think for anyone, to attempt to predict anything about the future at the present time. I always like to give you any information you request, but with conditions as they are, not only in business but in Washington, I think anyone is foolhardy to make any predictions about the future.

(The following statement was received too late for inclusion in regular alphabetical order).

Code Adherence Essential

By FRED M. ALLEN, *Secretary-treasurer, Southern Combed Yarn Spinners Association, Gastonia, N. C.*

STRICT ADHERENCE to NRA code hour limitations and wage minima, together with a constant close study of statistical data regularly presented in accurate form by textile trade associations, will combine to prolong the present favorable market status in the textile industry. Any other course will only speed the return of old chaotic conditions—and to follow any other plan for even 30 days will have dire results for the industry.

Code hours and wages will aid greatly in continuing the present feeling of satisfaction upon the part of labor. A breakdown in code hours will quickly bring about overproduction, no matter what the demand of recent months may have been. This demand cannot continue forever. A breakdown in wages will speedily, too, lead to price-cutting. The textile industry is so closely interrelated that a breakdown in even a small part anywhere will quickly bring harmful results.

It is more than ever before a time to work together, to maintain present management policies and to keep abreast of the statistical position.

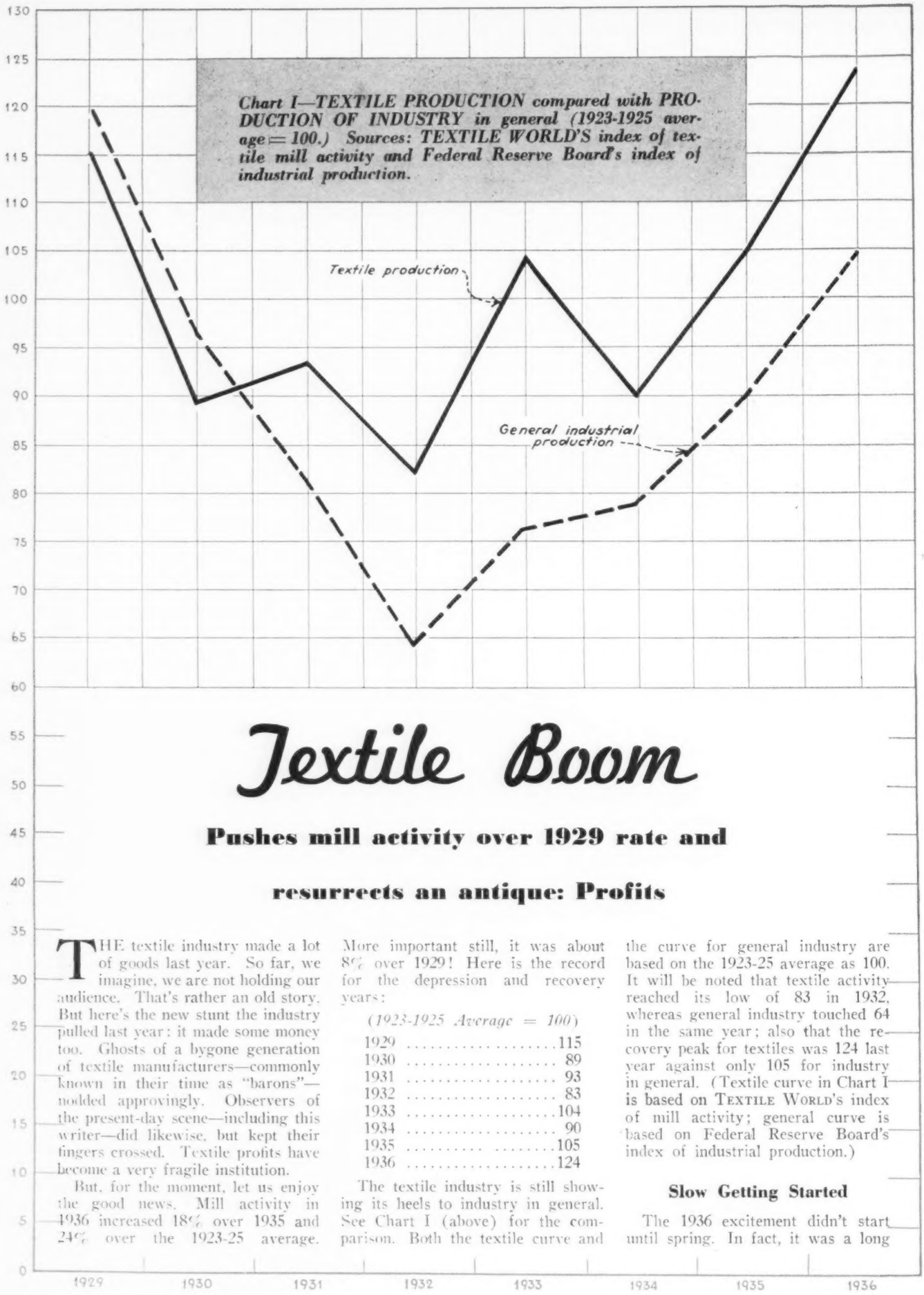


Chart I—TEXTILE PRODUCTION compared with PRODUCTION OF INDUSTRY in general (1923-1925 average = 100.) Sources: TEXTILE WORLD'S index of textile mill activity and Federal Reserve Board's index of industrial production.

Textile Boom

Pushes mill activity over 1929 rate and resurrects an antique: Profits

THE textile industry made a lot of goods last year. So far, we imagine, we are not holding our audience. That's rather an old story. But here's the new stunt the industry pulled last year: it made some money too. Ghosts of a bygone generation of textile manufacturers—commonly known in their time as "barons"—nodded approvingly. Observers of the present-day scene—including this writer—did likewise, but kept their fingers crossed. Textile profits have become a very fragile institution.

But, for the moment, let us enjoy the good news. Mill activity in 1936 increased 18% over 1935 and 24% over the 1923-25 average. More important still, it was about 8% over 1929! Here is the record for the depression and recovery years:

(1923-1925 Average = 100)

1929	115
1930	89
1931	93
1932	83
1933	104
1934	90
1935	105
1936	124

The textile industry is still showing its heels to industry in general. See Chart I (above) for the comparison. Both the textile curve and the curve for general industry are based on the 1923-25 average as 100. It will be noted that textile activity reached its low of 83 in 1932, whereas general industry touched 64 in the same year; also that the recovery peak for textiles was 124 last year against only 105 for industry in general. (Textile curve in Chart I is based on TEXTILE WORLD's index of mill activity; general curve is based on Federal Reserve Board's index of industrial production.)

Slow Getting Started

The 1936 excitement didn't start until spring. In fact, it was a long

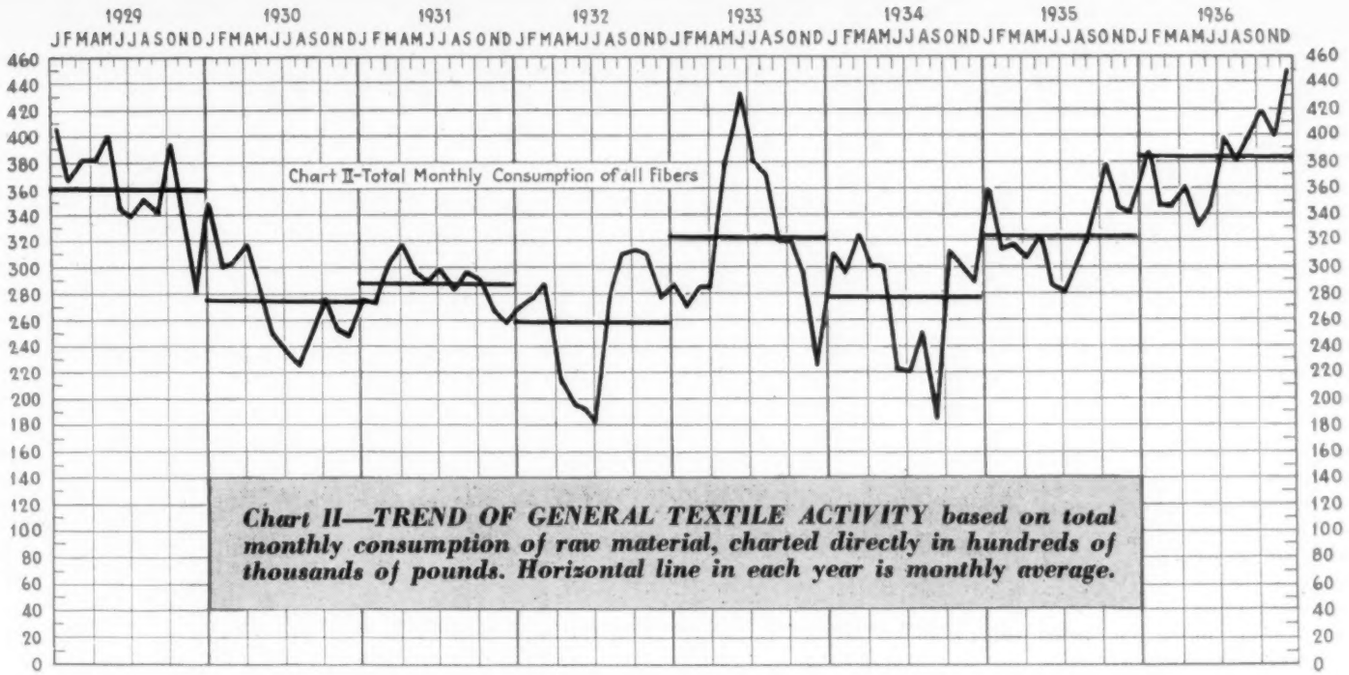

1929 1930 1931 1932 1933 1934 1935 1936
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Chart II-Total Monthly Consumption of all Fibers
460 440 420 400 380 360 340 320 300 280 260 240 220 200 180 160 140 120 100 80 60 40 20 0

Chart II—TREND OF GENERAL TEXTILE ACTIVITY based on total monthly consumption of raw material, charted directly in hundreds of thousands of pounds. Horizontal line in each year is monthly average.

hard winter. But suddenly, beginning in May, the textile industry started to go places.

At first, many couldn't believe it was true. In fact, when we published early in June an editorial entitled "Feeling Better, Thank You" and predicting "a better summer than is usually anticipated for that season—and a decidedly better fall than was generally expected a month or two ago," many of our friends, and others, called us a fool optimist.

Last Half the Best

Just how better it was from then on can be noted in Chart II which gives monthly consumption of textile raw materials from 1929 to 1936 inclusive. The summer and fall (1936) curve is a pretty thing.

And this activity was based on sales. The latter kept ahead of production in most branches of the industry, resulting in a fine back-log of unfilled orders at the end of the year.

And 1937?

Never has it been more difficult to make a textile prediction than it is for 1937. Obviously, the rate of sales and production which held during the last months of 1936—particularly in cottons—cannot continue indefinitely. The acuteness and duration of the "correction period" which is inevitable will be influenced largely by the general business curve. If the labor situation quiets down, and industry continues its forward march, the textile recession should be brief and not severe. On the bullish side is the fact that this is supposed to be the good year in the two-year cycle.

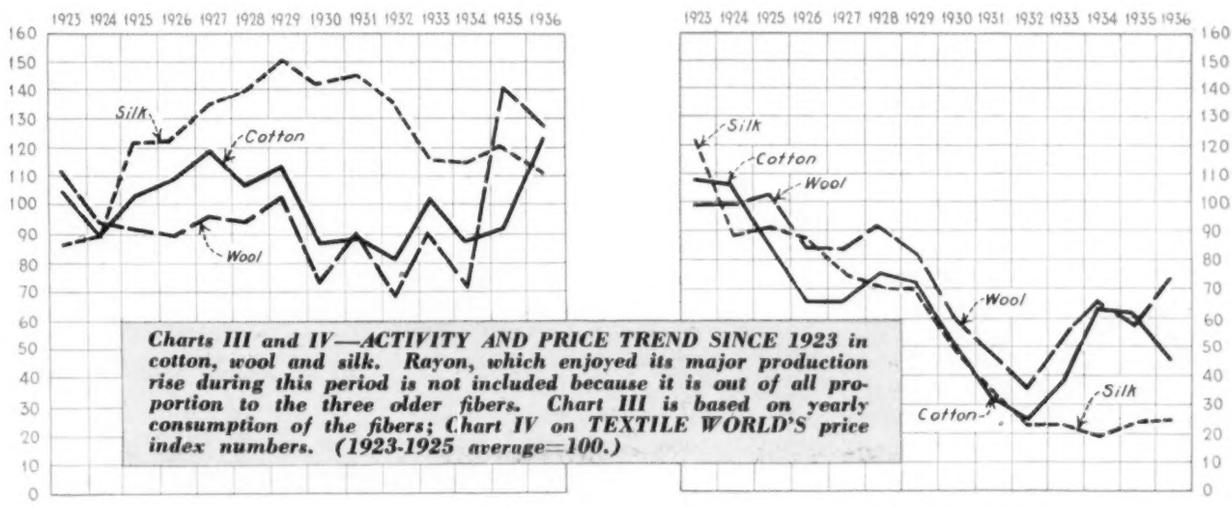
To be concrete, we would say that, if the textile industry reached the same rate of activity in 1937 that it did in 1936, it would be putting on a swell performance. If it dropped off say 10%, it would still have a good year.

Its chance for profits depends very largely upon the sanity with which it encounters whatever temporary slump the year may have in store for it.

Progress by Branches

The cotton division, as indicated above, made the best record in 1936, beating the 1935 production record by 26%—and selling all and more than it made. Wool consumption was 9% under 1935 but the latter was a record year; two such consecutive performances as 1935 and 1936 are something to write home about. Furthermore, things still look pretty good in that branch. Silk consumption resumed its decline, the 1936 figure being 8% under 1935. Rayon made a new record for itself, beating the 1935 level by 18%.

Production and price trends in the individual fibers are shown in Charts III and IV respectively.



Charts III and IV—ACTIVITY AND PRICE TREND SINCE 1923 in cotton, wool and silk. Rayon, which enjoyed its major production rise during this period is not included because it is out of all proportion to the three older fibers. Chart III is based on yearly consumption of the fibers; Chart IV on TEXTILE WORLD'S price index numbers. (1923-1925 average=100.)

Textile Machinery

Sales in 1936 only 6% under 1929

—Reach total of $100,000,000

◆ ***This is the latest instalment of the thriller "How the Textile Machinery Industry Came Back." It is based on confidential information supplied to TEXTILE WORLD by the equipment and allied manufacturers. This survey starts with the year 1929 and has been continued annually since then; consequently it covers the depression and recovery periods.***

SALES of textile machinery and allied products in 1936 returned very nearly to the 1929 level, coming within 6% of that year, according to TEXTILE WORLD's annual survey. The following facts are disclosed:

1. Dollar volume of sales in 1936 was 27% greater than that of 1935 and 49% above 1934. Relating this to the Census of Manufactures, it means that last year's sales of textile machinery, parts and attachments approximated $100,000,000.

2. The 1936 volume was the highest since 1929, and only 6% below that year. It was two and a third times the low mark set in 1932.

3. The following table of index numbers shows the trend of textile machinery sales from 1929 to date, based on 1929 as 100:

1929 ... 100	1933 ... 56
1930 ... 67	1934 ... 63
1931 ... 57	1935 ... 74
1932 ... 39	1936 ... 94

Comparison by Branches

Breaking the industry down into its major groups, manufacturers of preparatory, spinning and weaving equipment averaged a 26% increase in 1936 over 1935; knitting machine manufacturers reported a 16% increase; the bleaching, dyeing and finishing machinery group had the best advance—35%; while firms selling auxiliary equipment to textile mills, plus those selling accessories and supplies, increased their business by 27%. These several percentages compare with 27% for the industry as a whole, as noted above.

Optimism Almost Unanimous

The pessimists haven't a chance right now. Of the replies we got in our survey, 91% expect an increase in business in 1937; 6% are fearful, and 3% are on the fence. Estimates of probable percentage increase this year are modest, however, averaging approximately 12½% over 1936.

Here are representative predictions:

• "During the last three months of 1936 orders increased rapidly and it seemed to be the feeling among textile mill men that the recovery seemed more likely to be permanent than the various spurts that had taken place now and then in the last two or three years. It looks now as if good business would continue through 1937."

• "We look for a great improvement in all lines of our equipment during the coming year, and anticipate that our sales will probably assume proportions even greater than those of 1929, our peak year to date."

• "The prospects for the current year are decidedly more favorable, and we have every reason to assume that the volume for the year 1937 will be 75 to 100% larger than it was in 1936."

• "I consider that 1937 will be a good year, as the prospects seem to be very bright for substantial purchases of new equipment."

• "We have a more or less optimistic outlook on business for the coming year and substantial orders are continually being booked for specification at a later date. We find that most mills anticipate (and with ample reason) advance in prices and are seeking to cover at present price level."

• "With regard to the outlook for 1937 we are starting off with considerably more business on our books, and with evidence of greater activity all the way along the line."

• "It is my opinion that the outlook for textile machinery sales is very much on the up-grade and it is our anticipation that 1937 will see our volume within reasonable range of our normal volume."

Here are a few from men who have certain mental reservations:

• "Judging by the amount of business at the present time the future looks very promising. However, we feel there is apt to be a slight let-down later in the year."

• "The outlook for our machinery business this year looks very good at the present time for an even further increase in sales. On the other hand there may be a lot of trouble stirred up in the coming year which may neutralize effects of increase in business. Prices will undoubtedly go higher and whether we can keep them balanced or not is a question."

• "We look for considerable improvement this year in domestic business, but are rather afraid that this improvement in domestic business will be largely off-set by a decrease in our foreign business. On the whole, we feel that 1937 should be 15% to 20% better than 1936 and if the foreign market improves, the increase might run as high as 25% to 30%."

And here is one from a frank pessimist:

• "It is impossible for any one to picture any definite outlook without being pessimistic. Foreign-made articles form a base price, forcing our local mills to meet that price, which in turn makes it necessary for the American manufacturer to operate on a very low wage scale, causing discontent among employees, and has resulted in the past in mills liquidating due to foreign competition. I have never at any time seen as much foreign-made goods in our department stores as there was this year during the Christmas season. Without question, foreign manufacturers are more than anxious to reach the rich markets in the United States."

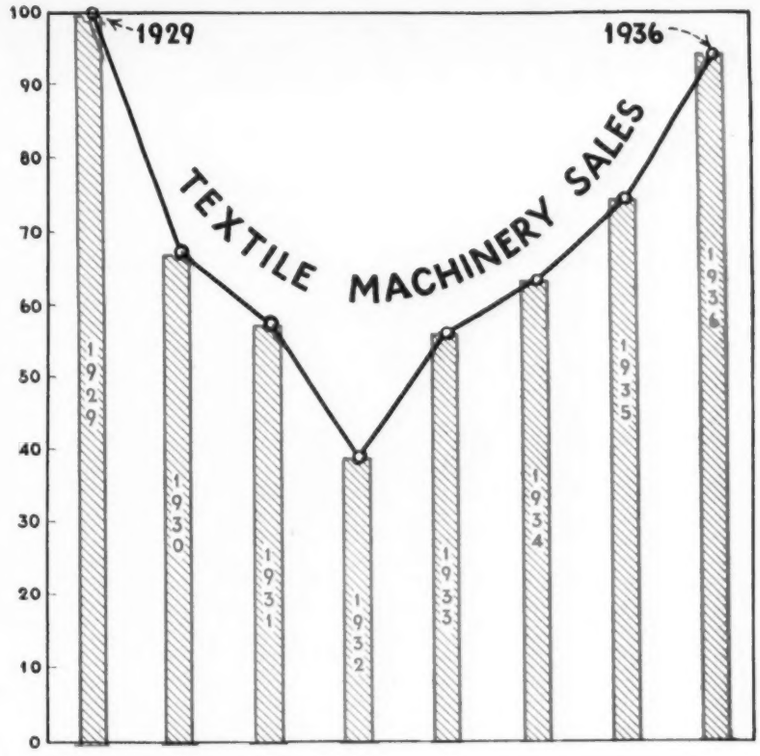
Replacement Still Emphasized

Despite the greater tendency toward actual physical expansion in the industry at present than for some years past, replacement possibilities are still

regarded by machinery manufacturers as their principal opportunity. Here are typical comments on that phase of the outlook:

• "A great deal of the increase will be due to increased purchases brought about by mechanical improvements in machinery which will actually make its purchase a profitable investment for the textile manufacturers."

• "We may confidentially expect a further increase in our sales, because there has been such a pent-up demand for our product during the last five years that the mills will simply have to replace a considerable quantity."



• "It is our belief that 1937 will be as good as, if not better than, 1936 from the standpoint of textile machinery sales. A number of mills have started on a long delayed modernization program which should carry on throughout 1937 and into 1938. 1936, from the profit standpoint, was one of the best years the textile industry has ever had and this is particularly true in the cotton branch of the industry. This relative prosperity is being reflected in a more receptive attitude to change, new equipment, supplies, and maintenance materials."

• "Everything indicates increased sales in our particular business of approximately 20% for 1937. Increasing labor, materials and overhead costs will make installation of new equipment more imperative than ever in our history."

• "There seems to be a decided tendency to make replacements at this time which we have not noted during some years past."

• "It seems to us that the textile mills, now that they are enjoying better business, are in the mood to spend money for new labor-saving machinery. I think they realize that if they are going to stay in business and make a profit they have got to invest part of their earnings in this way."

• "We are looking forward to doing an increased volume of business in 1937. We do not feel that this increased business will be due to the purchase of additional productive machinery but that it will be due to the replacing of obsolete equipment and to the purchase of additional equipment which is now necessary to produce high-quality work."

• "It is our opinion that the textile industry is becoming increasingly conscious of the necessity for machinery modernization. This is especially true of those mills which have found themselves in an unfavorable competitive position during the recent depression as a result of obsolete equipment which requires high maintenance costs but is incapable of high-quality work on a normal production basis. For that reason, we feel that the textile machinery business can look to a continued increase in volume in 1937."

A Warning or Two

Where any uncertainty exists among the contributors to our survey, it seems to be due to fear of over-production, to fear of labor trouble, and to fear of the tax burden. Below are a few thoughts on these worries:

• "The only fly in the ointment so far as this writer can see is the possibility of the industry suddenly discovering that it has over-produced these last six or eight months with a consequent falling off in prices and, as is usual under such circumstances, a complete reversal of the mental attitude on the part of the mill management from the present high, optimistic mood to one diametrically opposite."

• "Apparently, the textile industry is leading the way out of the depression. What the future holds for us, we are unable to predict. We believe that the only danger now lies in the possibility of a too rapid increase in production. The duration of our present prosperity will depend on how fast we go. It looks now as if we are very rapidly gaining momentum. In fact, too much momentum."

• "Due to many unlooked for contingencies — particularly in the way of strikes that may definitely tie up the steel, coal, and other industries—it is most difficult to prognosticate just what might be expected during 1937; and consideration must be taken that the expected purchasing power of the country might be seriously curtailed, should such condition continue to spread."

• "Should not the strike situation inject more consternation in the picture, and should the war clouds clear up, we fully expect to have a substantial increase this year."

• "As for a look ahead, if labor and the Administration do not upset things, it will be a good year."

• "Barring unsettled labor conditions we look forward to 1937 with continued confidence, which should result in approximately the same increase as we have enjoyed last year."

• "Aside from the uncertainties of business, with a Congress that no one can foretell how it will act, there is one factor which we are beginning to recognize as a real obstacle. I refer to the present tax law which prevents firms with impaired surpluses and quick assets from spending moderate profits for necessary new equipment and replacement without paying the Government an exorbitant tax. We have had two actual cases within the last two weeks of customers that had planned a reasonable appropriation for new equipment to be paid for out of moderate earnings, that have changed their plans materially rather than hand over to the Government approximately 30% of net profits in taxes."

Thank You!

Finally, we hope we may be pardoned for reprinting the following which—we are glad to say—was echoed by many of our correspondents:

• "We believe that such surveys as you are making are very beneficial to the trade, and are glad to do our bit, confidentially, of course."

Over 150 New Mills

Established during 1936, largely in the southern knitting branch

IMPROVING business in 1936 encouraged the organization and construction of a number of new mills and branch plants in most divisions of the textile industry, as well as the modernizing of existing units and reopening of innumerable mills long shut down. The greatest increase in number of new units came in the knitting field.

Interest in southern industrial development continues at a high pitch, and for this reason TEXTILE WORLD has compiled a list of new and branch plants organized and/or constructed during the last year. Financial reorganizations, transfers of ownership, and expansions of existing buildings literally ran into hundreds of mills affected, and, except in special cases, no effort was made to classify and list these.

It should be emphasized that other sections, as well as the South, saw considerable expansion of the number of units in operation. A list of some of the more representative additions in New England and elsewhere is included, along with a brief description of the southern developments. This grouping follows immediately and following it in turn is mention of the more important modernization jobs undertaken during the year:

COTTON

In the South: **Pearl River Corp.**, Picayune, Miss., capitalized at $300,000, announced plans for 180x275 ft. cotton mill. **Carolina Webbing Co.**, Greensboro, N. C., capitalized at $250,000, completed and put into operation new mill to manufacture elastic webbing. **High Point Spinning Mills, Inc.**, High Point, N. C., capitalized at $100,000, to operate spinning mill. **Herron Twine & Yarn Mills**, South Memphis, Tenn., new spinning mill. **Jaffee Products Mfg. Co.**, Dallas, Tex., capitalized at $30,000, to operate cotton mill.

In other sections: **Thomas French & Sons, Ltd.**, Manchester, England, branch plant at Fall River, Mass., to manufacture narrow fabrics. **Hoosac River Corp.**, Adams, Mass., capitalized at $25,000, to manufacture cotton goods.

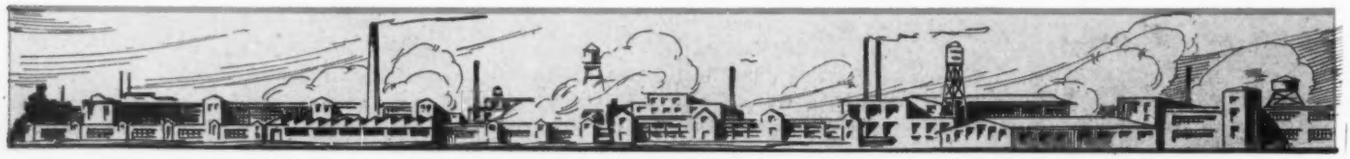
WOOL

In the South: **Killingly Worsted Co.**, Stoney Point, N. C., branch plant of New England firm, put into operation. **Anniel Woolen Mills**, Mt. Airy, N. C., organized with $100,000 capital. **H. London & Co.**, Sumter, S. C., incorporated (established previously). **Texas Scouring Corp.**, San Angelo, Tex., organized to construct $100,000 plant including machinery. **Staunton Woolen Mills, Inc.**, Staunton, Va., established plant employing 75 persons. **Philippi Woolen Mills, Inc.**, Philippi, W. Va., organized with $100,000 capital.

In other sections: **Hopewell Mill, Inc.**, Glastonbury, Conn.; **Cavedon Spinning Co.**, Worcester, Mass., **Manchaug Mills, Inc.**, East Douglas, Mass.; **Dissel Mfg. Co.**, Everett, Mass.; **Ludlow (Mass.) Mfg. Associates; Noanet Mfg. Co., Inc.**, Waltham, Mass.; **Lango Woolen Mills**, Corinna, Me.; **Canterbury Mills, Inc.**, Portland, Me.; **Riverside Mills, Inc.**, Lebanon, N. H.; **Mohegan Mills, Inc.**, Warrensburg, N. Y.; **Alta Weaving Co.**, Philadelphia; **Alsace Woolen Mills, Inc.**, Reading, Pa.; **Wallace Woolen Mills, Inc.**, Plymouth, Mich.; **Wovenfine Mfg. Co.**, Manistee, Mich.; **Alexander Brick Woolens, Inc.**, Los Angeles, Cal.

KNIT GOODS

In the South: **Pure Silk Hosiery Mills, Inc.**, Panama City, Fla., new organization, constructed small building and put 5 full-fashioned machines in operation. **Walton Hosiery Mills, Inc.**, Defuniak Springs, Fla., organized to produce full-fashioned hosiery. **Rogers Hosiery Co.**, Athens, Ga., branch plant of Germantown, Pa., firm constructed, costing over $200,000. **Lucky Stripe Silk Stocking Co.**, Fitzgerald, Ga., branch plant of Philadelphia firm established. **Spotlight Hosiery Mill, Inc.**, Rome, Ga., began operation with monthly capacity of 15,000 doz. pairs circular hosiery. **Albany Mfg. Co.**, Albany, Ga., organized to construct $75,000 plant. **Crisp Hosiery Mills**, Cordele, Ga., recently organized, leased and renovated 80x100 ft. building. **Black Hosiery Mill**, Midland, N. C., established with 20 machines. **Parkway Hosiery Mills, Inc.**, Ashville, N. C., organized with local capital. **Rutherford Hosiery Mills, Inc.**, Asheville, N. C., organized with local capital. **A. M. Wheeler & Sons, Inc.**, Brevard, N. C., established in leased building. **Hazel Knitting Mills**, Burlington, N. C., capitalized at $100,000, organized to take over and modernize properties of Foster Knitting Co. **R. T. Johnston Hosiery Co.**, Burlington, N. C., organized with $50,000 capital. **Fisher-Beck Hosiery Mills**, Cranberry, N. C., organized (finishing equipment only). **Finer Full-Fashioned Hosiery Co.**, Charlotte, N. C., granted charter with authorized capital of $100,000. **Penn-Carol Hosiery Mills**, Concord, N. C., recently organized, took over machinery of Thomas W. Buck Hosiery Co., Philadelphia, and will operate in leased building. **Glen Raven Knitting Mills, Inc.**, Glen Raven, N. C., established with 8 full-fashioned machines. Branch of Glen Raven Cotton Mills. **Callum Mfg. Co.**, Greensboro, N. C., organized. **Rufus D. Wilson, Inc.**, Burlington, N. C., new organization capitalized at $150,000, constructed plant at present housing 12 Reiner full-fashioned machines. **Carolina Hosiery Mills**, Elizabeth City, N. C., established to manufacture plain white army hose. **Archer Hosiery Mills, Inc.**, Graham, N. C., granted charter. **C. B. Goodman and John Brooks**, Hickory, N. C., announced plans for 20-machine mill. **Brooks Hosiery Mills**, Hickory, N. C., organized. **Ellis Hosiery Mills, Inc.**, Hickory, N. C., granted charter with $100,000 capital and 20 machines installed. **Whitener Mills, Inc.**, Hickory, N. C., capitalized at $50,000, established with 65 machines. **Sterling Knitting Mills, Inc.**, Hickory, N. C., incorporated with $100,000 capital. **Lincoln Knitting Mill**, Lincolnton, N. C., established with 50 machines. **Biltmore Hosiery Co., Inc.**, Naples, N. C., established with 10 full-fashioned knitting machines. **Whenball Hosiery Mills**, Newton, N. C., organized. **Grenaco Knitting Mills, Inc.**, Rockingham, N. C., established with 50 machines on men's hose. **Harrill Knitting Co.**, Rutherfordton, N. C., established with 138 machines on men's half hose. **Summers Hosiery Mills, Inc.**, Salisbury, N. C., granted charter with authorized capital of $100,000. **Spruce Pines Holding Co.**, Spruce Pines, N. C., organized to erect mill to be operated by Robins Knitting Co., High Point, N. C. **Halifax County Hosiery Mills, Inc.**, Scotland Neck, N. C., organized with authorized capital $150,000. **Burnett Hosiery Mills**, Taylorsville, N. C., established with 60 machines. **Blackstone Hosiery Mills**, Valdese, N. C., granted charter with authorized capital of $100,000. Mill will operate 100 machines. **Hackettstown Silk Hosiery Co.**, branch of New Jersey firm, to be established at Reidsville, N. C., on land recently purchased. **Alamac Hosiery Mills**, Reidsville, N. C., organized. **Dan Boone and O. N. Norris**, Chattanooga, Tenn., established new mill manufacturing misses', and infants' anklets. **Tennessee Hosiery Co.**, Chattanooga, Tenn., granted charter. **Charleston Hosiery Mills**, Charleston, Tenn., established with about 50 ma-



chines in operation. **Decatur Hosiery Mill, Inc.,** Decatur, Tenn., organized with $25,000 capital to manufacture anklets. **Denton Hosiery Mills,** Denton, Tenn., organized with 47 knitting machines. **Ricks Hosiery Mills,** Greeneville, Tenn., established with 100 machines. **Niota Mills, Inc.,** Niota, Tenn., organized with $50,000 capital, constructed new full-fashioned mill employing 40 persons. **Lorraine Mills, Inc.,** Sweetwater, Tenn., organized with $50,000 capital, installed 66 machines. **James Hosiery Mills Inc.,** Greenville, Tenn., granted charter with $50,000 capital. **Strickland Hosiery Mills,** Petersburg, Tenn., organized. **Nolde & Horst Co.,** McMinnville, Tenn., branch plant of Pennsylvania firm, established in former plant of Read Hosiery Mills. **Kenmore Hosiery Co.,** Fredericksburg, Va., granted charter with $50,000 capital, constructed 100x132 ft. plant costing over $40,000. **Oscar Nebel Co., Inc.,** Winchester, Va., branch plant of Pennsylvania firm, granted charter with $50,000 capital, began construction of plant. **Marshall Hosiery Mills,** Benton, Ky., organized with $25,000 capital. **Summit Textile Co.,** Summit, Miss., organized. **National Underwear Co.,** Little Rock, Ark., branch of St. Louis, Mo., firm, established. **Van Dyke Knitting Co.,** McComb, Miss., moved from Milwaukee, Wis. **Tru Tex Hosiery Co.,** Paducah, Ky., branch of Pennsylvania firm, established.

In other sections: **Connecticut Sportswear, Inc.,** Fairfield, Conn.; **Massachusetts Knitting Mills,** Boston, Mass.; **Passaconaway Weaving & Knitting Co.,** Lowell, Mass.; **Springfield (Mass.) Knitting Mills, Inc.; Bethlehem Knitting Mills, Inc.,** Chicopee, Mass.; **Ess Tee Mills, Inc.,** Lowell, Mass.; **Dunsboro Knitting Mills** Cohoes, N. Y.; **Dunlap Knitting Mills, Inc.,** Troy, N. Y.; **Meriden Knitting Mills, Inc., Dry Dock Mills Inc., H. L. R. Knitting Mills, Inc., Kraus-Fels-Metzger Co., Inc.,** and **Jackson Knitting Mills,** all of Brooklyn N. Y.; **Lebanon Knitting Mills, Inc., Abood Knitting Mills,** New York; **S. & P. Knitting Mills,** Long Island City, N. Y.; **Artex Knitting Mills, Inc.,** Cleveland, Ohio; **Esquire Knitting Mills, Gem Knitting Mills, Blatz Co., Gold Crest Knitting Mills,** all of Philadelphia.

SILK AND RAYON

In the South: **Premier Silk Mills, Inc.,** High Point, N. C., granted charter to buy and sell fabrics. Capital stock $250,000. **Barnes-Adams Throwing Co.,** High Point, N. C., organized with $100,000 capital, and put in operation. **Concord Silk Throwing Co.,** Concord, N. C., granted charter with $150,000 capital stock. **Roanoke Weaving Co., Inc.,** Roanoke, Va., organized as branch plant of Burlington Mills Co., constructed new plant costing over $100,000. **Navlen & Son, Inc.,** Cliftondale, Va., organized to manufacture silk ribbons. **Ming Toy Silk Mills, Inc.,** Morristown, Tenn., branch plant of New York, firm, reported to have been established. **Charles Van Houten** and associates, Scranton, Pa., organized mill at Pulaski, Va. **Georgetown Silk Co.,** Durham, N. C., branch throwing plant of Pennsylvania firm, put into operation. **Century Ribbon Mills, Inc.,** Radford, Va., branch plant of New York firm, constructed. **Hanover Broad Silk Works, Inc.,** Hanover, Pa., reported planning branch at Victoria, Va.

In other sections: **Elmira (N.Y.) Weaving Corp.; National Fabrics Corp.,** Allentown, Pa.; **Alvera Textile Corp.,** Allentown, Pa.; **Altoona (Pa.) Silk Corp.; Karl H. Toll, Inc.,** Clifton, N. J.

PROCESSING

In the South: There were few new processing or finishing plants established in the South during 1936. However, practically all of the present plants expanded greatly.

In other sections: Although a number of processing firms were reported in the Paterson and New York area as new plants, it should be noted that most of these mills actually are only newly set up organizations which have taken over existing mills.

A Glimpse of 1936's Modernization

A CROSS-SECTION of representative modernization work done in 1936 is given herewith. It is merely typical and not complete. Estimate is that over $100,000,000 was spent for machinery alone.

COTTON

Dwight Mfg. Co., Alabama City, Ala., addition costing over $100,000. **Florence (Ala.) Cotton Mills,** $100,000 program of modernization. **Pepperell Mfg. Co.,** Opelika, Ala., top-story addition with machinery. Lindale, Ga., plant, 31,000 long-draft spindles. **Eastern Mfg. Co.,** Selma, Ala., 10,000 long-draft spindles. **Bibb Mfg. Co.,** Macon, Ga., reported planning to spend $1,000,000 in general modernization. **Swift Mfg. Co.,** Columbus, Ga., addition costing $50,000 with equipment. **Martha Mills,** Thomaston, Ga., three-story addition. **Boger & Crawford Spinning Mills,** Boger City, N. C., addition to house 12,000 spindles. **Johnston Mills,** Charlotte, N. C., addition costing about $50,000. **Rocky Mount (N. C.) Mills** modernized throughout. **Sellers Mfg. Co.,** Saxapahaw, N. C., 17 long-draft spinning frames. **American Spinning Co.,** Greenville, S. C., $250,000 modernization program. **Maverick Mills,** East Boston, Mass., $75,000 addition.

WOOL

Peerless Woolen Mills, Rossville, Ga., $400,000 expansion and improvement program. **Atlanta (Ga.) Woolen Mills,** $35,000 addition. **M. T. Stevens & Sons Co.,** North Andover, Mass., expansions costing $100,000. **American Woolen Co.,** New York, $75,000 addition to Beaver Brook plant. **Branch River Wool Combing Co.,** Woonsocket, R. I., addition costing over $100,000. **Dartmouth Woolen Mill,** Claremont, N. H., weave room designed to increase production 25%. **Collins & Aikman Corp.,** Philadelphia addition costing $100,000. **Orr Felt & Blanket Co.,** Piqua, O., addition.

KNIT GOODS

Alabama Hosiery Mills Decatur, Ala., $250,000 expansion program. **Mock, Judson, Voehringer Co., of N. C.,** Greensboro, N. C., 107x128 ft. addition. **Lynchburg (Va.) Hosiery Mills,** unit costing $25,000 exclusive of machinery. **May Hosiery Mills,** Nashville, Tenn., two-story addition to accommodate 100 machines. **Belle Knitting Corp.,** Lebanon and Allentown, Pa., consolidated units, constructed dye plant, and installed knitting machines. **Wayne Knitting Mills,** Fort Wayne, Ind., $100,000 expansion.

SILK AND RAYON

Blue Ridge Textile Mills, Pulaski, Va., addition costing over $40,000. **Burlington (N. C.) Mills Co.,** several hundred thousand dollars on general expansion and improvement. **Emporia Textile Mills, Inc.** North Emporia, Va., new equipment including automatic box looms and dyeing machinery. **Stonecutter Mills,** Spindale, N. C., rayon finishing plant. **Pepperell Mfg. Co.,** Fall River, Mass., 138 looms.

PROCESSING

Lanett (Ala.) Bleachery & Dye Works, steam plant. **Proximity Print Works,** Greensboro, N. C., gravity filtration plan and water treatment system. **Southern Mercerizing Co.,** Tyron, N. C., warp mercerizing range. **Union Bleachery,** Greenville, S. C., modern gravity filtration plant and water-treatment system. **Franklin Rayon Corp.,** Providence, R. I., $65,000 addition. **Arkwright Finishing Co.** plant of Interlaken Mills, Fiskeville, R. I., electrical equipment and power plant.

RAYON

American Enka Corp., Enka, N. C., extensions and improvements costing $500,000 to $1,000,000. **E. I. du Pont de Nemours & Co.,** Rayon Division, additions in New York and Virginia costing several millions of dollars. **Tubize Chatillon Corp.,** $2,500,000 expanding and improving units at Rome, Ga., and Hopewell, Va. **Industrial Rayon Corp.,** Cleveland, Ohio, expansion and improvements costing $900,000. **Celanese Corp. of America, Inc.,** several additions to plant at Amcelle, Md. **Viscose Co.,** Meadville, Pa., $1,000,000 additions. **Tennessee Eastman Corp.,** Kingsport, Tenn., expansion program.

Japan Threatens

U. S. with her cotton goods but domestic industry helps itself

From TEXTILE WORLD'S *Washington Office*

AGAIN in 1936 Japan completely dominated U. S. textile imports by doubling the 1935 volume of cotton cloth imports, and by getting set to pour into our market upward to half a billion yards in 1937. Japan also increased her exports to us of cotton handkerchiefs, pile fabrics, rayon waste and filaments, and cotton hosiery, in some cases several hundred per cent. This serious problem, affecting more than ten per cent of American population, was brought to apparent solution, not by the Government, but by the in-industry itself, in unprecedented international negotiation.

Behind this unprecedented tariff penetration was a nation in a selling position without parallel in history. Japan was the only nation which had adopted modern mechanization, mass production, and merchandising methods *without* adopting the resultant living standards for its people. The Japanese worker made or saw most of the modern products of industry, but he bought none of them. At home he had a hut, a mat, and a bowl of rice, and was content. And largely because he demanded none of his own factory products, he was hired for 28c. a day.

This figure may not be accurate. Compensations and benefits received by workers and their families may have doubled the monetary wage. Some observers said that Japan's low production costs was not entirely due to low wages: that superior management, methods, equipment, elimination of small mills, buying and marketing operations were also involved. But few would concede that they were superior to the United States on any of these counts. Of course, the low exchange rate of the yen was in their favor.

Cost Advantage 10 to 1

Furthermore, the entire capital structure of Japan—the cost of mill construction, machinery, maintenance—all were scaled at their level of wages. Japanese industries were closely integrated with each other and with the leading families, who constitute the Government. Undoubtedly the industry received the best of services at reduced costs, including low freight rates from subsidized shipping companies on raw cotton from the United States and India. All told, the Japanese cost advantage over us must have been at least ten to one. So secure in their position did they feel that they ignored all tariff threats, believing that none could be set up under our law that would be effective.

***Japan Marches On*—as will be noted from the 1935 and 1936 figures.**

TABLE I—U. S. IMPORTS OF COTTON CLOTH *

	Total from all countries —Thousands—		Total from Japan —Thousands—	
	Sq. Yds.	$ Value	Sq. Yds.	$ Value
1922...	142,458	39,073	9,481	2,389
1923...	218,970	47,188	10,777	1,884
1924...	177,386	37,703	9,235	1,442
1925...	109,249	26,424	5,378	791
1926...	60,680	16,253	2,267	329
1927...	63,002	15,596	1,862	260
1928...	61,295	15,842	1,710	256
1929...	61,185	15,901	1,217	189
1930...	35,517	9,426	1,016	119
1931...	34,732	7,034	770	106
1932...	29,436	4,248	789	57
1933...	41,348	6,360	1,116	79
1934...	41,534	6,736	7,287	363
1935...	63,674	36,475	36,475	1,728
1936...	114,185	10,558	77,066	3,456

* General imports prior to 1934; imports for consumption after 1934.

Meanwhile the American cotton industry in 1936 was faced with almost directly opposite conditions with its wage-rates set above the natural economic level by the NRA and AAA attempt to improve the lot of the workingman and of the farmer. Even after both of these acts were invalidated the industry at large still maintained prescribed standards or better.

And in addition to our wage problem we had the drought, which reduced our agricultural products and opened the market for imports at higher prices. General imports in 1936 increased 18% as compared with 7% increase in exports. Thus the flood of Nipponese cotton goods ran with a strong current of general merchandise flowing in the same direction.

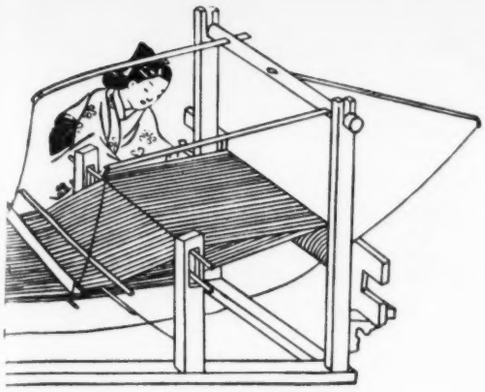
They Bunched Their Shots

It was not so much the volume of Japanese cotton cloth imports that wrought havoc; before 1936 the volume was less than 1% of our production. What at first irked the industry was the Japanese concentration on certain classes of cotton piece goods. Fine goods they could not manage so well, because of quick style changes; gray goods were no particular attraction to importers; but bleached goods, which had wide versatility and could be sold into processing channels in a few hours, were just their ticket.

These Japanese goods, of course, sold at deadly low prices to dealers, but it was not the price, per se, that hurt. It was the psychological effect of the price that stung. Dealers heard of imported goods bargains, hesitated, started creeping paralysis in the trade. Yet the public bought no sheets, no shirts, no handkerchiefs at prices based on Japanese import prices. Only importers benefited.

So the industry appealed to the Tariff Commission, which submitted a report to the President, who, in May, ordered an average 42% increase in the tariff on goods of yarn counts between 30 and 50, to be effective June 20. Importers loaded up like camels at the last water hole. In June nearly 12,000,000 yd. rolled in. Next month the volume dropped but started to climb again in August, and December approached June with 10,839,000 yd., over 9,000,000 of which was bleached.

It became clear to the textile industry, if not to the State Department, that Japan was indeed a unique industrial and commercial force in the world which had to be dealt with in some special



way. The Government's non-discriminatory tariff policy was, because of Japan's low cost scale, automatically discriminatory in Japan's favor. Yet the Government obviously could not discriminate against Japan by aiming a just tariff at her. The Government was stuck tight in the middle. At this point the textile industry stepped in and demonstrated a new kind of international trade negotiation.

The Industry Helps Itself

The Murchison mission sailed for Japan on Dec. 24. They sat down with Japanese manufacturers and learned that the latter had already contracted 155,000,000 yd. for delivery to American dealers by Jan. 21. Indeed it looked like the half-billion yard bolt the industry had predicted for 1937.

The solution the Murchison mission offered the Japanese now seems quite simple. They suggested that the Japanese cut their volume, increase their prices to match ours, stop concentrating on bleached goods, and still make as much money for themselves as ever. The Japanese agreed to limit their 1937 exports to the 155,000,000 yd. already contracted, to cut the total for 1938 to 100,000,00 yd. The 1937 shipments may be increased by as much as 25,000,000 yd. but whatever the figure it will be deducted from the 1938 quota. These limitations were to include trans-shipments through other countries. They also agreed to discuss with the committee at any times necessary, new distribution in different areas of our market.

As already indicated, activity in Japanese textiles was *the* import news of 1936. While the industry watched that, it missed nothing else. The only change worthy of post comment was a value increase of about 20%, with a substantial yardage increase, in woolen and worsted piece goods (over four oz.) from the United Kingdom. Reported extra activity in blankets from Japan and elsewhere fails to show up in either cotton or wool figures.

The textile industry showed no concern about the imports of goods from various countries to meet the demand for specialties. Price competition was the weapon that cut, and Japan was the only country in a position to wield it.

Time has yet to show whether the Murchison agreement will solve the Japanese problem; the industry believes it will. Critics said the agreement should have been made a year ago when the flood might have been kept down to a modest 50,000,000 yd. Others said that the industry displayed, in 1936, the same brand of enterprise and resourcefulness in its foreign relations that it used at home, where many of its aims were realized in the face of strong odds.

TABLE III — CORDUROYS AND VELVETEENS

Corduroys

	Total		Japan	
	Sq. Yd.	Value	Sq. Yd.	Value
1934	48,100	$13,905	.....	.....
1935	13,093	3,978	8,706	$1,483
1936	488,130	91,590	479,923	86,999

Plain-Back Velveteens

1934	101,805	25,869	73,128	14,099
1935	1,792,624	268,952	1,786,758	265,937
1936	4,901,743	696,273	4,891,702	691,907

Twill-Back Velveteens

1934	27,880	18,461	10,637	2,080
1935	25,893	13,439	6,799	2,185
1936	151,515	47,180	132,380	32,760

TABLE IV — COTTON HOSIERY

	Total Imports Doz. Pr.	From Japan Doz. Pr.
1935....	745,670	644,641
1936....	2,056,651	1,919,557

TABLE V—RAYON WASTE AND STAPLE FIBER

	Rayon Waste Except Cellulose Acetate		Filaments Not Exceeding 30 In.	
	From All Countries			
	Pounds	Value	Pounds	Value
1935	3,914,562	$537,425	1,457,023	$317,090
1936*	7,943,151	791,734	10,053,391	2,225,338
	From Japan			
1936*	6,904,521	667,136	5,614,798	841,105

* First eleven months. Exemption from excise duty of staple fiber and other "artificial silk" waste, which became effective in 1935, was further extended in 1936 to include certain rayon yarn with ruptured filaments, flat strip straw exceeding 3/8 inches in width, and tubular straw in pieces not exceeding 10 inches in length. U. S. production of these fibers increasingly mixed with wools and other fibers, was only about 50% of requirements. The demand brought a large volume from abroad, mostly from Japan.

***Here is the Japanese cotton goods story* of 1936, in figures. The tariff anticipation load-up in June was the eight-digit feature of the year. After July, despite the tariff, the Japanese flood gradually rose until in December it again approached the June mark.**

TABLE II—IMPORTS OF BLEACHED COTTON GOODS FROM JAPAN

Compiled by the Bureau of Foreign & Domestic Commerce
Imports for Consumption, Square Yards—Preliminary Figures *

1936	40s	41s	42s	43s	Other Bleached Goods Affected by Increased Tariff	Bleached Goods Not Affected by Increased Tariff	Total Imports of Bleached Goods
January	370,986	234,873	1,335,858	2,107,778	1,616,646	176,792	5,842,933
February	1,251,543	56,754	743,106	1,301,521	1,415,264	255,906	5,024,094
March	320,892	1,236,189	1,122,742	1,706,930	2,292,070	585,690	7,264,513
April	314,219	1,081,754	831,248	1,802,777	1,138,271	255,144	5,423,413
May	242,222	809,418	1,183,465	747,189	1,261,643	244,232	4,488,169
June (before tariff increase)	592,882	717,476	2,260,704	2,408,227	3,626,041	909,946	10,515,276
July (under old rates)	.....	3,460	.....	79,899	352,028	.....	435,387
August (under old rates)	.....	.....	.....	208,800	.....	.....	208,800
Average Jan.-May	499,972	683,798	1,043,284	1,533,239	1,544,779	303,552	5,608,624
June (under new rates)	.....	.....	10,000	93,600	42,000	.....	145,600
July " " "	74,302	.....	139,333	337,200	105,567	1,320,831	1,997,233
Aug. " " "	289,889	121,883	83,583	763,898	440,499	682,547	2,382,299
Sept " " "	442,445	392,989	585,354	930,774	540,813	516,582	3,408,957
Oct. " " "	268,668	128,867	1,412,525	531,535	1,037,821	1,077,243	4,456,659
Nov. " " "	1,042,269	199,111	1,116,724	1,196,545	869,666	1,314,384	5,738,699
Dec. " " "	.....	.....	.....	.....	.....	.....	9,326,436†

* By Cotton-Textile Institute. † Department of Commerce.

Textile Securities

Move with the trend and so stockholders get a break

THE trend of textile securities during 1936 was *up*, definitely and positively. Shares which for years had resembled a setting of ancient eggs suddenly showed signs of life, and before the year ended hatched forth some nice fluffy little chickens in the form of real dividends.

A study of 34 southern and 27 northern securities shows a difference of 27 points, in the case of the former, and 30 points in the case of the latter, between the high and low for the year. Since in most cases, the "last" for the year was very close to the high this meant a plus trend approximating those two figures.

The accompanying exhibits give details for the South and for New England. Table I shows the movement of a group of southern textile stocks from 1933 to date, with 1926 for comparison—thus telling the story of the trend before, during and since the depression. This table also gives high and low prices for 1936. Chart I portrays the price swing of another group of southern stocks from 1923 to 1936 inclusive.

Table II gives high and low prices for Fall River and New Bedford mill stocks during the last two years. In Table III, the sharp rise in dividends is revealed, the 1936 percentage for the Fall River group being 1.18% against 0.08% in 1935; and the 1936 percentage for the New Bedford group being 1.27% against 0.3% in 1935. So, stockholders too shared in the textile improvement last year.

Chart I — Average price trend of 25 southern mills stocks, 1923-1936 (From R. S. Dickson & Co., Charlotte, N. C.). Figures are given quarterly.

Table I—Southern Textile Stocks Before, During and After the Depression (From A. M. Law & Co., Spartanburg, S. C.)

	Present Div. Rate	Jan. 1937	Jan. 1936	Jan. 1935	Jan. 1934	Jan. 1933	Jan. 1926	1936 High & Low	
Avondale Mills	1*	50	28½	30	30	16½	45	50	25
Beaumont Mfg. Co	7	100	90	80	90	30	320	100	90
Belton Mills	.....	13	6	7	9½	5	62	11	4½
Bibb Mfg. Co	4	114	88	72	74	35	195	114	73
Brandon Corp. "A"	.....	60	21	25	34	6	....	57	16
Calhoun Mills	4	50	35	36	38	25	125	50	33
Chadwick Hoskins Co	.70	10½	6	7	9½	4	16	10½	6½
Clifton Mfg. Co	9	130	105	83	74	37	142	130	102
Columbus Mfg. Co	6	70	75	60	55	40	138	70	45
D. E. Converse Co	7	101	75	64	55	35	110	101	70
Dunean Mills	8	141	106	97	94	35	93	141	103
Erwin Cotton Mills	6*	105	84	96	70	60	....	107	79
Florence Mills	6	66	29	36	33	13	....	66	26
Gaffney Mfg. Co	2	41	19½	21	20	5	83	40	18
Glenwood Mills	8	91	66	80	70	50	133	91	63
Gossett Mills	4*	66	41	43	33	17	....	66	35
Hartsville Cotton Mills	6	88	70	75	75	50	152	88	65
Inman Mills	8	108	75	60	50	40	148	108	70
Judson Mills "A" pfd	7	90	65	70	63	38	105	87	61
John P. King Mfg. Co	.....	50	30	50	55	30	120	50	30
Laurens Cotton Mills	2	56	45	60	40	25	150	56	35
Marion Mfg. Co	6	77	71	73	70	47	140	80	65
Monarch Mills	6	90	73	68	58	35	133	90	69
Newberry Cotton Mills	6	97	76	65	55	32	131	97	70
Orr Cotton Mills	4	70	23	32	28	15	101	71	21
Pacolet Mfg. Co	.....	56	25	20	22	6	211	56	23
Pacolet Mfg. Co., pfd	7*	106	74	60	48	25	103	108	68
Piedmont Mfg. Co	8*	155	115	104	95	54	138	146	110
Riverside & Dan River	.....	24½	9½	11½	9½	4	47	24½	9½
Riverside & Dan River, pfd.	6*	111	98	95	57	35	150	112	95
Southern Bleachery pfd.	7*	104	94	76	62	35	....	105	87
Spartan Mills	8	136	111	108	90	35	151	136	108
Union-Buffalo, 1st pfd	7	103	75	76	76	20	93	101	67
Victor-Monaghan Co	4	68½	32	46	57	28	109	68½	27

Table II—Highs and Lows on Fall River and New Bedford Stocks

(From Sanford & Kelly)

	1936		1935	
a. Fall River	**High**	**Low**	**High**	**Low**
Algonquin Printing	140	117½	160	120
Barnard Mfg. Co.	10*	10*	3	2
Berkshire F. Spg. Com.	23	2½	4½	1½
Berkshire F. Spg. Pfd.	95	23	31	18
Border City Mfg. Co.	35	2⅜	5½	2½
Bourne Mills	105	25	26	20
Charlton Mills	52½	27½	42½	28
Luther Mfg. Co	37	10	37	25
Narragansett, Pfd	No Sales		No Sales	
Pilgrim Mills	67	21½	26	26
Richard Borden Mfg. Co.	27	3	4	2½
Sagamore Mfg. Co	89	19¼	25	18
b. New Bedford				
Beacon Mfg. Co., Pfd.	101	64	68	59
Booth Mfg. Co., Com.	1½	⅞	1½	1
Booth Mfg. Co., Pfd.	23¾	4½	4	3½
Gosnold Mills, Com	70	3	11½	4
Gosnold Prior Pref	24½	22½	....	....
Gosnold Mills, Pfd	95†	30	30	18
Grinnell Mfg. Corp	5	1½	4½	1
Hathaway Mfg. Co	80	42	45	32½
Kilburn Mill	65	29	32½	20
Nashawena Mills	17½	1⅜	4½	1½
Neild Mfg. Corp	27	5½	8½	5
Nonquitt Mills	36	3½	4½	3½
Pierce Mfg. Corp	25	10	26	13
Quissett Mills	41	19¾	19½	15
Soule Mill	30	15	20	16
Taber Mill, Com	2	1	No Sales	
Taber Mill, Pfd	No Sales		No Sales	
Wamsutta Mills	28½	5½	7	3

Table III—1936 Dividends Paid by Fall River and New Bedford Cotton Mills

(From Sanford & Kelly)

a. Fall River	**Capital**	**Paid**	**Amount**
Border City	*$414,586	$1.50	$27,000
Bourne Mills	†713,032	5.00	50,000
Charlton Mills	1,200,000	2.00	24,000
Luther Mfg. Co.	350,000	1.00	3,500
Pilgrim Mills	999,000	2.00	19,980
Richard Borden	1,000,000	1.00	10,000
Sagamore Mfg. Co.	3,000,000	5.00	150,000
	$7,676,618		$284,480
Paid in 1936 on a $24,063,507 capital	$284,480		1.18%
Paid in 1935 on a $23,885,586 capital	20,000		0.08%
An increase of	$264,480		1.10%

* 18,000 no par shares. † 10,000 no par shares.

b. New Bedford			
Beacon, Pfd	$1,080,000	6.00	$64,800
Gosnold, Pfd	825,000	2.00	‡16,500
Hathaway	1,250,000	6.50	81,250
Kilburn Mill	*792,000	1.00	10,560
Nonquitt Mills	†2,512,066	2.50	120,000
	$6,459,066		$293,110
Paid in 1936 on $23,022,909[a] capital	$293,110		1.27%
Paid in 1935 on $27,039,867 capital	89,800		0.30%
An increase of	$203,310		0.97%

* $75.00 par value. † No par value, 48,000 shares. ‡ Cash payment acct. back dividends; stockholders of 6% Pfd. also received 1 share 5% Prior Preference stock (par $25) for each share to complete payment dividend arrears of $27.
[a] Beacon Mfg. Co. included.

PRECISION

THE NEXT STEP TO PROFITS IN TEXTILES

. . . Introduction by Douglas G. Woolf . . .

THE special section of the Annual Number starting on this page had its origin in Blowing Rock, N. C., one beautiful Saturday morning last summer. In fact, the weather was so fine, and the glimpses of the mountains through the windows were so enticing, that I was not giving my undivided attention to the convention of the Southern Textile Association, then in full swing.

But suddenly these words caught my attention and dragged it indoors: "The succesful operation of cotton mills is likewise becoming a business of precision." The speaker was Robert R. West, president of Riverside & Dan River Cotton Mills, Danville, Va. Fortunately, this statement occurred at the start of his address; so I was able to hear it all.

"Textiles . . . a business of precision." This thought has been in my mind ever since. In those few words, it seemed to me, Mr. West had given the textile industry a keynote for 1937 —and TEXTILE WORLD a theme for its 1937 Annual Review and Forecast Number. Incidentally, he applied his thought to the cotton division of the textile industry, but it applies with equal force to the industry as a whole.

It applies, too, to every phase of management, to every operation. The more I thought of it, the more I became convinced that the theme should not—in fact could not—be narrowed to the idea of precision which a technician has, for example. That is part of the story, of course, but only a part. The precision, in its broader sense, which is portrayed in the following pages, is a precision of thought, of planning, and of execution.

"To those of us who occupy our time in, and devote our energies and thought to, the operation of cotton mills, there is an increasing accumulation of evidence which indicates that the successful operation of cotton mills is likewise becoming a business of precision."

—says Robert West

If there is one general fault which has characterized textile manufacture in the past, it is—in my opinion—a sort of sloppiness in management. As a result, policies have not been clear-cut, and too often there has been no sure way to profits.

During recent years, it seems to me, there has been a trend away from this sloppiness—and in the direction of precision. But there is still a long road ahead before textiles will really be a business of precision.

And so this "Precision Section" has been developed from the thought which Mr. West germinated at Blowing Rock. In this section, we are trying to present a practical outline of the way in which precision can be applied to all phases of textile mill management: Production planning and control; cost methods; merchandising; employee relations; job analysis; research; standardization; mill testing; utilization of new instruments; inspection and maintenance of equipment; modernization of plant and equipment. We have tried to apply this thought to the problems of the individual mill, rather than to those which must or may be met by the industry collectively.

As a background for these individual articles, I want to include in this introduction the following paragraph from Mr. West's Blowing Rock address:

"The past decade in the cotton textile business has afforded what have been considered substantial margins only on those rare occasions of intense speculative activity. The ordinary course of our business is along paths which permit profit only to those who attain the utmost in technical proficiency. Such accomplishment demands management without waste, either of time, effort, money or material; in short, a management of precision."

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PRECISION THROUGH PRODUCTION CONTROL

By Charles D. Warren

IN many of the older mills in New England stocks of gray and finished goods were allowed to accumulate, regardless of the possibility of their disposal at a profit. Yarn inventories were built up far in excess of actual requirements. Delivery schedules were not met, because no effort was made to lay out the work in such a way as to utilize the machinery available to the best advantage. Employees became dissatisfied when they were sent home because warps were not ready for the looms when needed. What happened to these mills is well known. Today many textile men are of the opinion that the difficulties in which these mills found themselves could have been avoided if more attention had been paid to production planning and control.

It is certain that to obtain precision in mill operation, intelligent planning and definite control of production are vital necessities, and there is a growing recognition of the fact that it is a mistake to attempt to operate a mill without a production planning and control department. In the system of planning and control outlined below, particular emphasis is placed on planning from the standpoint of actual sales requirements —a matter which thus far has not received adequate attention in most organizations.

The first requirement is a "master planning board." On this board are the sales manager, the president or some other major company executive, the mill manager, and the head of the manufacturing planning department; often a financial officer of the company is an asset or even a necessity. This master planning board should deal with the broad aspects of planning, keeping in mind always that the success of any mill operation depends largely on sustained operation on a normal-shift basis, rather than production marked by peaks and valleys throughout the year.

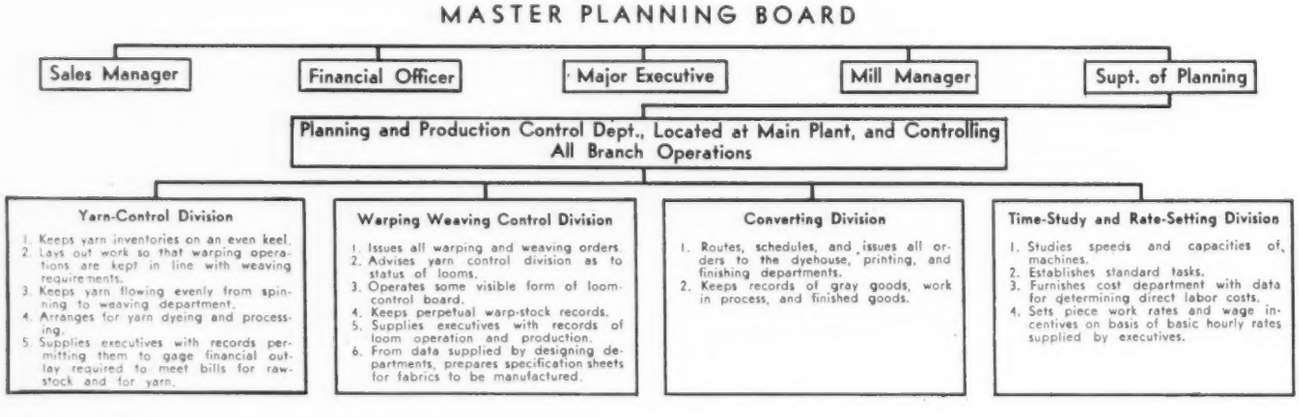
The sales manager should be able to anticipate his requirements for the year with a fair degree of accuracy. With this information at hand, the executive head of the company must decide to what extent the anticipated mill production is to be spread out over the year. The mill manager and the mill planning department head then can proceed in an intelligent manner to lay out work for the looms; provide for the necessary amount of yarn at the proper time; and plan the dyehouse and finishing operations, either on the basis of shipping requirements or availability of gray goods from looms.

Through a study of sales analyses, stock and production records, etc., the master planning board is able also to decide intelligently to what extent new fabrics should be manufactured and to what degree some of the older numbers should continue to be run. This automatically avoids the building up of stock on obsolete numbers and over-enthusiasm on the newer qualities.

The manufacturing planning and production control department should be located at the mill, or, where a group of mills is involved, at the plant where there is the most activity. In addition to laying-out, routing, and scheduling production, this department should maintain such statistical and manufacturing control records as are needed by the executives for their guidance.

The size of the department will depend upon the size and scope of the mill. The department should be headed by a man who has actual mill experience and who is familiar with general mill practice. Its value to the company will depend to a large extent upon its ability to cooperate with each and every department in the mill and with the sales department. The organization of the planning and production control department under the master planning board is shown graphically in the accompanying chart. Likewise, are shown the major functions of each of the four divisions of the planning department. Certain of the records of the plannig department prove useful and are furnished to other departments, such as the accounting, purchasing, employment, designing, shipping, and engineering departments. The planning and production control department *per se* makes for precision in mill operation. Linked into the master planning board, it assists in obtaining controlled inventories, prompt deliveries to customers, and sustained operations throughout the year.

Organization of production planning and control department under master planning board


MASTER PLANNING BOARD
Sales Manager
Financial Officer
Major Executive
Mill Manager
Supt. of Planning
Planning and Production Control Dept., Located at Main Plant, and Controlling All Branch Operations
Yarn-Control Division
1. Keeps yarn inventories on an even keel.
2. Lays out work so that warping operations are kept in line with weaving requirements.
3. Keeps yarn flowing evenly from spinning to weaving department.
4. Arranges for yarn dyeing and processing.
5. Supplies executives with records permitting them to gage financial outlay required to meet bills for raw-stock and for yarn.
Warping Weaving Control Division
1. Issues all warping and weaving orders.
2. Advises yarn control division as to status of looms.
3. Operates some visible form of loom-control board.
4. Keeps perpetual warp-stock records.
5. Supplies executives with records of loom operation and production.
6. From data supplied by designing departments, prepares specification sheets for fabrics to be manufactured.
Converting Division
1. Routes, schedules, and issues all orders to the dyehouse, printing, and finishing departments.
2. Keeps records of gray goods, work in process, and finished goods.
Time-Study and Rate-Setting Division
1. Studies speeds and capacities of machines.
2. Establishes standard tasks.
3. Furnishes cost department with data for determining direct labor costs.
4. Sets piece work rates and wage incentives on basis of basic hourly rates supplied by executives.

PRECISION THROUGH COST METHODS

By Ralph E. Loper

Ralph E. Loper Co.

ANY well-equipped textile mill can make a profit today, regardless of its location, if capable management is guided by adequate, up-to-date cost information. It is easier for the executive selling the cloth to add 1c. per lb. to the profit of the mill through well-directed sales effort than for the superintendent to cut his cost ¼c. per lb. without reducing the quality of his product. Textile executives who have adequate, up-to-date cost information are adding greatly to the profits of their plants by taking full advantage of the present market opportunities. Most textile executives who are not so equipped can add several times the amount of their salaries to the profits of their mills by installing simple, practical cost methods as a guide to their sales policies.

In periods of depression, when it seems necessary to accept nearly every available order in order to operate the plant, it is not possible to take full advantage of accurate cost information. Today, however, there are plain fabrics which differ in manufacturing cost by less than 2c. per lb., but which differ by more than 5c. per lb. in their selling prices. Among fancy fabrics there are some which offer five times as much profit as other fabrics suited to the same type of loom.

The majority of textile mills have made some study of their cost problems. Often the superintendent has made a very reasonable distribution of the payroll. In many cases the advantage thus gained has been lost, however, when the distribution of supplies, salaries, depreciation, taxes, insurance, etc., has been attempted.

Some treasurers contend that it is not necessary to divide the overhead between the weave room and the various yarn departments to get accurate costs by fabrics. They frequently argue that, since they sell only cloth, all these charges must be borne by the cloth eventually so that it does not matter how they are distributed, so long as the correct total is included.

By comparing the results from a number of mills where the burden has been correctly distributed, we find that distribution of overhead has a very important bearing upon the relative costs of styles. In mills having simple looms and making plain cloth, the overhead charges are about as important as the weaving piece work. Among mills using automatic looms, the overhead charges on cloth are often more than twice as great as the weavers' pay. Confusion and errors are almost certain to occur if the cost system fails to make each product bear its fair portion of the overhead.

The standard cost system not only furnishes a reliable guide in the choice of profitable fabrics, but can also be used advantageously in directing efforts to reduce manufacturing costs. One of the first steps in developing a standard cost system is to establish careful budgets covering all items of overhead and labor, and setting up standards on speeds, production, waste, etc. Many mills are finding this information to be a valuable help in their efforts to reduce costs.

Unless one has the opportunity to compare costs on similar fabrics in a great many plants, it is hard to realize the extent to which manufacturing costs can be reduced without reducing the size of the employee's pay envelope. It is not unusual to find differences in cost among mills in the same locality on the same fabric amounting to more than twice the normal profit on the fabric.

Many mills which have a modern system for ascertaining the manufacturing cost of their various products still use a uniform percentage of selling expense applied to all their products. If a mill produces a narrow range of products which are all distributed in the same manner, this may give sufficient accuracy. Usually, however, it will pay to analyze this situation carefully, separating the products into several groups and charging to each group as many direct items of salaries, travel expense, advertising expense, carrying charges, etc., as possible. After the balance of selling costs are apportioned equitably, it may prove a real surprise to see how much selling costs differ between the various lines of products and between different channels for distributing the same product.

Considerable interest is now being shown in cost methods by textile mills which need to revise their systems because of recent changes in wages and other increases in costs. The points which a good cost system should cover are given briefly in the accompanying table.

The cost of operating such a cost system is usually less than 1c. per 100 yd. of cloth produced. Those managements which have shown the best records of earnings year after year believe in the value of modern cost methods and use them in their plants.

A New England mill treasurer who has consistently shown a profit after depreciation during each of the last five years recently stated that he did not believe these profitable results could possibly have been realized without the regular use of the cost methods which he had installed six years ago when the mill was losing money.

ESSENTIALS OF A GOOD COST SYSTEM

1. The system should be simple to operate and convenient to use. The agent or treasurer should be able to quote on any of his styles in any raw material market without delay.

2. The system must preserve the true relative cost of the various products. That is, it must be free from the effects of accidents in production and any unusual temporary manufacturing conditions.

3. The overhead must be distributed in such a way that each product will bear its equitable share.

4. The cost system should be prophetic, rather than historical. Its accuracy should apply to the period for which sales are contemplated and not to any period of the past.

5. Its accuracy must be susceptible to proof, which usually implies reconciliation with the general accounts.

6. The cost system should furnish the management with convenient checks upon current actual manufacturing costs.

PRECISION IN PROFITABLE MERCHANDISING

By Allyn McIntire

Vice-President, Pepperell Mfg. Co.

PRECISION merchandising is a good deal more simple than the term might suggest. It means, briefly, the substitution of tested methods in selling for the old-time trial-and-error procedure. Or, putting it another way, it means the application to *selling* textiles of the technical research principles that have long been applied to *manufacturing* textiles.

One of the most significant phases of textile management today is the marked trend among manufacturers toward applying technical ideas to selling as well as to production,—a trend which has opened up new vistas of profit possibilities to those firms following it. The era of haphazard production of fabrics and of haphazard selling plans which are not geared to advertising and to consumers' wants, appears to be nearing an end. Instead, textile manufacturers now carefully control the entire course of their selling activity so that each step coincides exactly with every other function, not merely in merchandising but throughout the organization.

A glance at the modern sales picture will illustrate this point. Today textile manufacturers put forth particular effort to link their advertising and selling plans; as a result the sales department is not only fully informed on what advertising is doing, but is encouraged to link up the company's advertising with its own work all along the line. The outcome has been a great increase in selling efficiency. Textile salesmen today do a lot more than quote prices and explain constructions. They also are familiar with the circulation figures of media carrying the company's advertising, and thus they can talk authoritatively of consumer interest in the product. They can offer valuable suggestions to retail stores on display devices that key up with the advertising message. They can talk to sales people in terms of advertising value. In short, they carry through the precision thought by making full use of the effective tool which advertising is in their hands.

Equally important progress has been made with respect to setting up the advertising budget. In the old days, this was merely a matter of allotting a sum of money, calling it "an advertising budget" and spending it in accord with the limited merchandising knowledge then available. Today, precision is applied, and great care is exercised to allot the advertising appropriation to specific tasks. The total sum is broken down into small units with a special job planned for each. Among the important divisions in the up-to-date advertising budget are: national advertising, newspaper advertising, display material, direct mail, and special appropriations for exhibits, house organs, and even for dealers' mats. Obviously this method involves regular and exact check-ups of results in each division.

"The era of haphazard production of fabrics and of haphazard selling plans which are not geared to advertising and consumers wants, appears to be nearing an end. Instead textile manufacturers now carefully control the entire course of their selling activity so that each step coincides exactly with every other function, not merely in merchandising but throughout the organization."

—Says Allyn McIntire

Merchandising effort must be correlated to production as well as to sales. Textile manufacturers today are alert to the danger of having their advertising build up a demand which the production department could not fill. In linking advertising to sales it is equally vital that both these departments fully understand the mill's production problems. No longer does the company advertise goods which are not profitable or which are not readily available. The key to the necessary coordination here is a three-ply program of frequent consultations: Production, advertising and sales departments meet at regular intervals and exchange notes on current lines. Thus a perfectly balanced precision program is developed, with all three functions of the business working hand in hand.

Probably nowhere is the precision principle more helpful than in the difficult task of gaging consumer trends. Extensive consumer surveys now are a standard method of supplying desired data here. Let us suppose a manufacturer plans a new line. To assure himself of its saleability, he will first interview by mail or directly a large group of consumers to get their opinions. Or suppose he plans a new type of package for his merchandise. This involves substantial outlay; so he must be sure in advance that the package is acceptable. Then he does one of two things: (a) employ a research organization, or (b) undertake a consumer survey himself, to ascertain what consumers think of the new package beforehand.

The precision principle is gradually being applied to all the other sub-divisions of textile merchandising, but the same fundamental is true throughout, namely the use of scientific tests to indicate results in advance. Broadly speaking, the foundation of successful textile merchandising may be summed up as: A perfect correlation between all departments within a given company. All departments—credit, advertising, sales, production, and of course financial,—must work constantly together with the one objective in mind: profitable business.

Textile manufacturers can still go much further in taking the "guess" out of merchandising. But they have made great progress, and with the example of their own technical attainments in production before them, it should not be difficult for them to apply the same principles further in selling their product.

PRECISION IN EMPLOYER-EMPLOYEE RELATIONS

By Luther H. Hodges

Production Manager, Marshall Field & Co.,
Manufacturing Division, Spray, N. C.

ASSUMING that the textile business is now, or is getting to be, a precision business, and assuming further that in TEXTILE WORLD'S plan of articles we already have the mill built and the money provided for raw materials and supplies, I shall make the statement that the most important thing ahead of us is—people.

What is precision in employee relations and how can we obtain it? Usually those of us connected with textile plants think of precision as applying to the settings on a cotton card to 1/10,000 of an inch, or to the diameter of a rayon fiber, or to expansion by heat, or to the testing of a shear blade by a thin piece of paper, etc., etc. All these things and a thousand others with which we contend from day to day may call for precision, but so do our dealings with our employees!

Can we have precision in dealing with people? Yes! If being definite in our plans means precision, we can. If having a real objective in employer-employee relations means something to us, we can! I have not the space nor the inclination in this article to discuss many of the old plans and practices, nor even to mention some new ideas that have occurred to me in the last year or so, but I would like to chat a bit about the necessity for precision in our thinking regarding our employees, and precision in our plans for carrying out these thoughts or philosophies!

In my case, I love people and am still crazy enough to think that it is essential for us to have a proper and precise approach to the problem of dealing with people. Even with this sentimental-sounding approach, however, I do not kid myself into thinking that this will ward off trouble or make employees like everything that is done. I still think the employee prefers money to sentiment, good running work to an enameled bathtub, clean and comfortable working conditions to a course in psychology, and overtime work (if based on 40 hours) to a class in the economics of over-production.

To train a great man, one should start with his grandparents. To develop an efficient, loyal employee (who doesn't "sit down" to loaf or strike), one needs to consider the employee's background. Where does he come from? What did his parents do? What is he interested in? Why did he come to our mill? Where else has he worked? Can we really offer him anything different in the way of a future?

In all of this thinking, we possibly should get the cooperation of the press and the schools, and yes, the churches, in preparing the employee for his work. Their attitude toward our industry must be fair, they must be informed. On the other hand, the mills must be ready with their part of the program. They must put their house in order to make the job attractive to the young men and women who are to fill the mills of the future. It is said we represent a backward industry—of low wages and low standards. We could argue these points, but "never explain:"—as Elbert Hubbard once said—"your friends don't require it, and your enemies won't believe you anyway." Yes, we must be ready with vigor, with a program, with plans to go forward. We must offer not only a challenge but also an opportunity for those we seek as employees.

We must use common sense and some semi-scientific selection and placement—otherwise we fail in precision methods! We must realize that the textile worker is human, is ambitious, is usually fairly reasonable. So, we can have a program of wages, of promotion and of follow-up. We can even have a scientific, well-directed wage-program with attention to elements of time and motion and methods. We not only can but *must* do these things if we are to be fair and if we are to have precision or efficiency.

We must link the past with the future by a wide-awake present, in our employee relations. This will call for efficiency in management: (1) to furnish work to employees; (2) to afford them a satisfactory wage with good working conditions; (3) to help them secure desirable and needed services, such as group insurance, group hospitalization, credit unions, homes to own, etc.

Precision in employer-employee relations! What an idea to conjure with, what an ideal to strive for! We cannot purchase such a thing with money, with stock dividends, or with mere wages—it is something more. It is not wooed in Wall Street, nor won in Worth Street—*its explanation is found in the hearts of employees who have confidence in their management.*

We cannot afford to be smug—we are but to fail; we dare not be arrogant—defeat is a matter of time. We must have ideals in our objectives; human interest, friendliness and fairness in our approach; wisdom and vision in our planning, and precision in our methods.

PRECISION in employer-employee relations

—"is not wooed in Wall Street, nor won in Worth Street; its explanation is found in the hearts of employees who have confidence in their management"

—says Luther Hodges

PRECISION THROUGH JOB STUDY AND TRAINING

By Allan H. Mogensen
Industrial Consultant

A WELL-KNOWN industrial engineer said recently, "At least 30% of the average industrial worker's motions are waste motions." This may sound high, but actual experience in plants where motion-economy programs have been conducted proves it no exaggeration. And inasmuch as eliminating waste motions reduces fatigue, there is no one who benefits more from such study than the operator.

To many, any discussion of motion study at once brings visions of complicated procedures, micromotion experts, elaborate studies involving much expense. Such is not the case. The problem of securing increased precision and efficiency is not so much one of devising brand new methods and tools, but rather one of getting workers generally to use, properly and consistently, the correct methods and tools which we now have. It means standardization of work methods. A brief study of most any operation will indicate that there are several ways in which the operation may be performed. A real analysis of the various ways of doing a job generally determines that there is one best way, one series of small operations or motions that will result in the greatest efficiency; and this, invariably, is the easiest way.

They Learned the Wrong Habits

The prevention of waste of time through these unnecessary motions is largely a matter of forming habits of precision and careful workmanship. Careless, slipshod methods are in use simply because workmen at the start learned wrong habits and were permitted to use them for years and years. Now, when you attempt to teach correct methods, you encounter a baffling resistance to change.

The key to efficient workmanship is the continuous repetition, over and over, true to form, of correctly planned methods of work. There are no short cuts. This point of view is not new to management. Managers have known for many years that training is necessary, but they are perplexed to know how to get these correct habits ingrained in workmen. The principal difficulties are that the supervisory organization, particularly the second-hands, are not aware of the importance of proper habit formation. They do not see the necessity for breaking incorrect work habits, they do not know how to go about developing the proper habits in their operators, and they are not aware of the significance of constant supervision to see to it that good habits remain fixed.

As an illustration of this, all the forewomen in a large textile plant were assigned the drawing of a right- and left-hand process chart as part of their work in a motion-economy course. These were turned in to the supervisor for checking, and nearly all of them went back. They did not check with the one the supervisor had made, although they all had studied the same operation—one on which all the operators were supposedly using the same method. This, by the way, was in a plant where good operator training had been in progress for ten years.

Each forewoman interviewed insisted that her chart showed exactly the method used by the operator she had studied. Thus when the operation was subjected to close analysis, such as that using this tool of motion economy, it became evident that there were a great variety of methods used. As a result, and after much study and discussion, and meetings with various operators, the one best way of doing that job was worked out, and written up as shown in Fig. 1. This then served as the instruction sheet for retraining all operators and training new ones. Departmental average efficiency rose several points just through this small change, and many of the operators who were low were able to increase their earnings appreciably.

OPERATOR CHART
DRESS CAKE & THREAD-UP WINDER

Left Hand		Right Hand
	1.	1. To cake board
	2.	2. Cut thread above balloon ring
	3.	3. Grasp & remove ring from empty insert
Grasp empty insert (fingers inside)	4.	4. Ring to cake board, left of position
To stock pole	5.	5. To cake on stock pole
Release insert on pole	6.	6. Grasp cake by large end, so that fingers and scissors are on inside of insert
To wrap on cake in right hand	7.	7. Remove cake from stock pole
Unwrap cake	8.	8. Hold cake by large end
Tuck wrap into top of insert	9.	9. Grasp tucked top of wrap with fingers
Pull of loose thread	10.	10. Hold
	11.	11. Catch thread under thumb
Break thread 10" from cake	12.	12.
Waste in bag	13.	13. Cake to cake board
To balloon ring and grasp	14.	14. Release cake
Place ring on cake	15.	15. To thread and grasp
To and grasp thread just below washboard	16.	16. Twist to loose end below guide
Pull thread through guides by twisting loosely on fingers	17.	17. To and grasp new cake thread just below washboard
Place thread in washboard and trip wire	18.	18. Apply tension to thread and open washboard with thumb
Pull thread up	19.	19. Release thread
Hold thread in position just in front of spindle	20.	20. To and grasp thread above drop wire
To left of cone	21.	21. Place thread in traverse button

Fig. 1. Right- and left-hand process chart

Operation: Lacing
Type: L.T.T. - S.U.
Details: 1 Spindle
Machine: Ensign
Code: 852
Pull upper down onto spindle
Press down pedal to start machine and move fingers to this position
Hold upper while being laced. As spindle is automatically removed, upper is moved up and slightly to right while machine ties knot and cuts thread. Laced upper is finished in this position
Move finished upper to a position over stack of finished uppers
Place finished upper on stack
Repeat cycle

Fig. 3. Illustrated instruction sheet for operator

Charts Show Opportunities

These charts readily indicate, to one who understands the principles of motion economy, just where opportunities for improvement lie. It is merely a detailed description of the motions of both hands entering into the perform-

ance of an operation. One column shows the motions performed only by the right hand; the other shows those performed by the left. Symbols such as those in Fig. 2 are used to aid in visualizing the operation. Even though this was only a maintenance job in one textile plant, it resulted in cutting the cost to less than half.

The former method chart indicates several delays and unbalanced conditions that are corrected in the new method, shown to the right.

A further step is the use of still pictures along with the detailed description of the hand motions. Even with the best wording on the charts,

RIGHT AND LEFT HAND PROCESS CHART OF SANDING AND POLISHING A THROWING TAKE-UP BOBBIN

FORMER METHOD

BRUSH & SAND PAPER X
BOBBIN CASE
FOOT LEVER
POLISH. CLOTH
LACQUER

OPERATOR

LEFT HAND	RIGHT HAND
POLISH BOBBIN	POLISH BOBBIN
CLOTH ASIDE	CLOTH ASIDE
PLACE CLOTH ON RACK	PLACE CLOTH ON RACK AND WAIT
TO BOB. IN F	
REMOVE BOB.	
BOB. TO CASE	TO CASE
BOB. IN CASE	BOB FROM CASE
TO R.H. ABOVE F	ABOVE F
GRASP FROM R.H.	BOB. TO L.H. AND WAIT
BOB. TO F	
BOB. IN F	
TO ROUGH S.P.	
TO S.P. IN R.H.	TO BOB. POSITIONING
GRASP S.P.	
TO BOB.	
SECOND SAND	SECOND SAND
S.P. TO BENCH	RELEASE S.P.
	INSPECT FOR SMOOTHNESS
	TO BRUSH
PLACE S.P. ON BENCH	GRASP BRUSH
TO POLISH CLOTH	BRUSH TO LACQUER
GRASP CLOTH POSITION & WAIT	DIP BRUSH
	BRUSH TO BOB.
	LACQUER BOB.
	BRUSH TO BENCH
	PLACE BRUSH ON BENCH
	TO POLISH CLOTH
	GRASP CLOTH
	CLOTH TO BOB. POSITIONING

TOTAL INDICATED TIME = 0.516 MIN. PER BOB.

PRESENT METHOD

BOBBIN CASE
LACQUER AND BRUSH
SAND PAPER X
POLISH. CLOTH
FOOT LEVER

OPERATOR

LEFT HAND	RIGHT HAND
POLISH BOBBIN	SAME
CLOTH ASIDE	"
PLACE CLOTH ON RACK	"
TO BOB IN FIXTURE, F_2	" , F_1
REMOVE BOB.	"
BOB. TO CASE	"
BOB. IN CASE	"
TO NEW BOB IN CASE	"
REMOVE BOB. FROM CASE	"
BOB TO FIXTURE, F_2	" , F_1
BOB IN FIXTURE, F_2	" , F_1 AND WAIT
TO ROUGH S.P.	
PLACE S.P. ON BENCH	"
TO FINE S.P.	"
GRASP FINE S.P.	"
TO BOB. IN FIXTURE	"
SECOND SAND	"
S.P. TO BENCH	"
PLACE S.P. ON BENCH	"
TO BRUSH ON LAC. POT	"
GRASP BRUSH	"
DIP BRUSH	"
BRUSH TO BOB., F_2	" , F_1
LACQUER BOB.	"
BRUSH TO LAC. POT	"
PLACE BRUSH IN POT TOP	"
TO POLISH. CLOTH	"
GRASP CLOTH	"
CLOTH TO BOB.	"

TOTAL INDICATED TIME = 0.59 MIN. PER 2 .....

Fig. 2. Chart for sanding and polishing bobbins

the lower supervisors, instructors, and operators often have difficulty in interpreting them. A photographic illustration alongside the written instruction leaves no doubt as to just how the hands and even the fingers in each hand should be positioned for best performance. Such a chart is shown in Fig. 3. The taking of these photographs has been greatly simplified by the use of a small camera set-up as shown in Fig. 4. This uses 35-mm. film, which is inexpensive and permits good enlargements to be made when needed. The pictures are then mounted on cards and these in turn reproduced for use in the plant by each operator.

The Final Step

The final step in the use of the motion-study tools is the motion-picture camera. At present this is still regarded as an ultra refinement and often associated with micromotion analysis. It is a safe prediction, however, with the reduction in cost of equipment and film (together with growing understanding that the taking of motion pictures in the plant is not at all difficult), that the next few years will see the acceptance of this new aid to method improvement and operator training.

Fig. 5. The motion picture is useful job-study tool

In one plant in the South, this training has been extended to the point where no new method would be set up without its use. Right- and left-hand process charts drawn up form the basis of discussions held by supervisory and operator groups. Foremen and forewomen discuss the various charts from the standpoint of the motions involved, working out the one best way that can be seen at the time. These new motions are then taught to a few of the operators.

When they have acquired skill on the operation, process charts are again made and analyzed. Final refinement through the use of the process chart is followed by filming some of the best operators. The films are then shown to various operator groups. In fact, small curtained booths were set up right in the production areas, and before each shift operators came in and discussed the loops of film as they were run through. It was not at all uncommon to find several operators involved in quite a discussion as to just exactly which fingers should be used in tying a certain knot. Several might feel that their own method was superior to the one that had been agreed upon by the group. This discussion was encouraged up to the point where the one best way could be selected, and then all were expected to learn this method and become proficient at it.

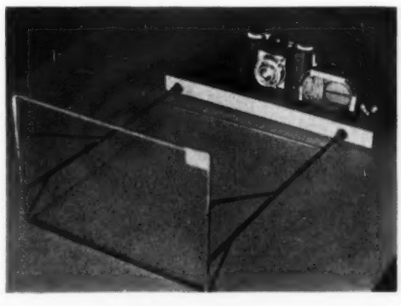


Fig. 4. Camera arrangement for still pictures

Surprising Results

Surprising results have been obtained from work of this sort. In one instance training time has been cut down to one-quarter of that formerly taken. In another plant even higher average efficiency is being obtained on a group of new operators at the end of three weeks than was previously attained after sixteen weeks of training. In still another plant a whole department had been trained with the motion-picture film when the new plant was built. It was erroneously assumed, however, that these operators would stay trained. A year later, departmental efficiency was only 68. A month of retraining with the process chart and film method brought the average up to 75.

Executives and supervisors are not usually qualified to do the training job. Even knowledge of the job and ability to perform it in every detail does not mean that the foreman or supervisor can teach it efficiently, either in whole or part, to others. Teaching is in itself a profession, as much as any other art, and the individual foreman must be taught to teach. Whether it is methods, or sound thinking, we must not only give the foreman the facts, but we must help him in getting them across to his operators.

PRECISION THROUGH RESEARCH

By E. R. Schwarz, F.T.I.
Associate Professor of Textile Engineering
Massachusetts Institute of Technology

PROGRESS and research are closely linked. Each comprises the activity of today and the assurance of tomorrow. It is increasingly the case that textile research is being devoted to assurance of greater and greater precision.

To a large extent textile materials are subject to the influence of a number of variables which affect the nature and magnitude of the properties being examined. It has been known for many years that moisture regain has a profound influence on the stretch, strength, weight, and rigidity of a fabric; but anything like adequate control of moisture conditions in both the atmosphere and textile is a result of fairly recent research concerned with the magnitude of the changes produced and the start of inquiry as to how and why they occur.

The first effort of the textile technologist is to bring about general adoption of test equipment and methods for quality control by the industry. Thus, means have been made available for the testing of strength, stretch, abrasion, fading, launderability, flexibility, rigidity, thickness, porosity, twist, color, electrical conductivity, and moisture regain, and for optical analysis. But for a considerable time these tests, instead of settling questions of fact, more often were the cause of argument and uncertainty.

If a fabric were tested for tensile strength by one laboratory and later by another, one of the laboratories frequently found it well above specifications, while the other often found it below, although both performed the test with similar equipment. Research showed a reason for the discrepancy. It was discovered that the moisture regain had a decided effect upon the strength and stretch. Thus came the air-conditioned laboratory. Results were better, but still did not always agree. Further research showed that the strength obtained also depended upon the rate of load application and the capacity of the testing machine. These are now definitely specified, and increased precision in quality control results.

The first abrasion machines were

crude devices for rubbing a fabric surface. The appearance of the material before and after testing was the criterion of the severity of the wear. Research developed the fact that wear is not all external. The newer machines therefore provide for flexing and impact effects. It was found also that the wear produced could be measured in a number of ways. The weight of material removed could be determined. The change of strength at right angles to the direction of abrasion, the number of cycles to rupture, the change in thickness, the change in porosity, the change in luster, the nature of the material removed—all now can be measured.

Research showed that fading of dyed fabrics depended not only on the dye, the fiber, and the intensity and duration of exposure to ultra-violet light, but also on the nature of the visible light striking the material and the temperature and humidity of the surrounding air. It made possible the development of much faster colors and gave added precision to the fastness test.

Research is furnishing an increasing store of information about that illusive property of fabric called "handle." The variable factors which influence rigidity of fibers, stiffness of fabrics, creasability, thickness, and resilience under compression are being studied. Soon it may be possible to measure and to predict the "draping" quality of cloth. Service is important to the ultimate consumer, who is demanding that the manufacturer give assurance that his product will satisfy. Research has improved the precision of the determination of service conditions.

The old method of measuring twist was crude and unsatisfactory. Now research has made possible twist testers which allow the insertion of the yarn, straight but not stretched, and under definitely controlled tension. Research resulting from the use of such machines showed that a yarn may actually become shorter by untwisting and longer by twisting, and a mystery which has bothered tire-cord manufacturers was solved.

Recording spectrophotometric color analyzers for measurement and specification of color with the human element eliminated, delicate instruments for measuring the electrical resistance of yarns, ultra-high-speed motion-picture and stroboscopic cameras, rapid electrical and chemical determination of moisture regain, and half a dozen special kinds of microscopes are daily adding to the power and knowledge of the textile technologist. They are making it possible daily for the mill men to make precise determinations of the behavior of his looms, spinning frame travelers, and finishing machinery. They allow him to meet definite specifications exactly. They enable him to buy materials intelligently—to know about the quality and performance, rather than to guess or take the word of a high-pressure salesman.

Research makes possible more precise processing through improved machinery; through control of drafting temperature, humidity, pH, speed, moisture content; and through improved quality of fibers, both natural and synthetic. It is only necessary to look at the phenomenal progress of the rayon industry—born of research, nourished by research in its infancy, depending upon research for its present and future—to realize concretely what a valuable thing is precision through research.

PRECISION THROUGH STANDARD SPECIFICATIONS

By William H. Whitcomb

Secretary, Committee D-13
American Society for Testing Materials

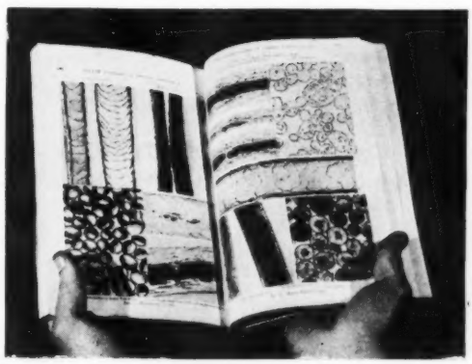
UNTIL the advent of mechanical fabrics there was little, if any, need for exact knowledge of the inter-relationship of the construction of a textile and the service rendered by it. The introduction of fabrics as strength members in fabricated articles made such knowledge necessary. The old qualitative criteria of appearance and feel were useless except to direct attention to suitable types of construction In order to obtain the required uniformity, it was necessary to specify acceptable limits of variation in the properties of the raw materials.

Consumers of fabrics in the more-or-less esthetic field of household and garment textiles, cognizant of the benefits which have accrued to users of mechanical textiles, are actively seeking similar benefits through specifications.

The value of specifications to the consumer is apparent. But how about the textile mill? There is no doubt about there being a "best" construction of a given type of textile for a particular purpose. Unfortunately, all consumers of a textile for a given purpose do not have the same idea as to the best construction. Just as the individualism of textile mills is expressed in their products, so consumer individualism is expressed when it comes to the question of drawing up fabric specifications. Often, lack of elemental knowledge of textile manufacture results in weird specifications. Not so long ago, a knitter received specifications for a jersey cloth from one of the largest consumers in the country. The specified yarn number and construction made it absolutely impossible to meet the specified weight.

This independent, and sometimes ill-directed, search for the best necessitates the stocking of several constructions by the mill, where formerly only one was made. Mill operation and accounting have become more complicated. Little wonder that many a mill man looks upon specifications as the inventions of the devil to harass him. This is not an indictment of specifications, but of the kind of specifications the mills have been asked to meet.

Specifications are necessary and are with us to stay. How then can we secure the greatest advantage with the least trouble to all concerned? We believe the answer is to be found in standard specifications.



The industry's most important handbook on specifications and test methods: "A. S.T.M. Standards on Textile Materials," issued annually.

Let us consider the case of three mills manufacturing enameling duck. Each mill supplies the same three consumers, each of which has specifications differing more or less from the others. Each mill must weave and stock three styles. A conference is arranged at which the requirements of the consumers and the abilities of the mills to meet them are frankly discussed. Specifications for a single style are drawn. These specifications then become standard for the group. Extend this to cover the field, and we have a "standard specification."

The advantages of standard specifications to the textile mill are almost too obvious to need mentioning. They mean getting back to the days of fewer styles. They mean increased simplification and smoothness of operation. Looms operate much more economically on one style day after day than when being shifted from one style to another or kept idle, dependent on orders. Fewer changes will mean fewer mistakes. Mill costs will be reduced through smoother operation, greater volume on one style, one stock from which all orders may be filled, and simplified accounting. The quality of the product can be maintained at a higher level, because it is possible to control more precisely the various steps in its manufacture.

Standard specifications can be developed only through the cooperation of both manufacturer and consumer. Neither can dictate to the other. A satisfactory material can be developed only through a frank discussion of the problems involved. Much has been accomplished through the efforts of the Division of Simplified Practice and the Division of Trade Standards of the National Bureau of Standards and by Committee D-13 on Textile Materials of the American Society for Testing Materials. Many of the manufacturers' associations and other groups are participating in the work.* Many standards have been made, but progress does not stop with the development of a standard. More exact information and improved methods suggest revisions, and so the work advances.

Textile manufacturers should seize every opportunity to assist in the development and use of standards as a means of simplifying their own problems. They can assist in the greater use of existing standards by being prepared to meet them and by diplomatically steering prospective buyers to standard constructions. They can assist in furthering standardization through active membership in bodies which are engaged in that field. In this way they can assist by making available the vast accumulations of invaluable experience and data and by contributing the facilities of their laboratories.

The benefits derived through standardization assure its growth. Standardization benefits the manufacturer as well as the consumer, and each must have an active part in its advancement to insure the development of sane specifications through collaboration.

*For a comprehensive list of standards see the Textile Standards Directory in the TEXTILE WORLD *Yearbook and Catalog*, 1936 edition.

PRECISION THROUGH LABORATORY CONTROL

By Howard P. Galloway

Research Department, TEXTILE WORLD

INCREASING application of the precision principle to textile manufacture through laboratory control of processes and products has sounded the death knell of one of our fondest fallacies. The industry is gradually emerging from the suffocating smugness induced by the feeling that, since it is one of the most ancient of crafts, there is nothing new to be learned.

To a great degree we have been suffering delusions with respect to laboratory control. In good times, when mills were running at peak production, employers have been wont to say, "Laboratory control? What do I need with laboratory control? Business is good. We're running day and night. Why should I waste money on a laboratory?"

And then, when the pendulum swung the other way (as it inevitably must) and business became poor, we heard from these same men, "Laboratory control? Business is terrible. I can hardly keep my employees working at part time. Expenses must be cut to the bone. I can't afford a laboratory."

Laboratories Profitable

But, happily, this mania is passing. The truth of the matter is, every mill can not only afford laboratory control, but cannot afford to be with out it. The proof of the pudding lies in the fact that those mills which have installed and operated suitable laboratories are profiting by them and are leading the way in proclaiming laboratory control and technical research as essential to the efficient operation of the modern textile-manufacturing organization.

An interesting case in point is that of the Blank Co., operators of nearly a dozen plants throughout the eastern section of the United States. The story of the adoption of laboratory-control methods by this organization points a prophetic finger to the future of the textile industry as a whole.

About twelve years ago, in an unused corner of one of its plants, the subject company installed a small laboratory, staffed by two young enthusiasts. These men had as equipment (beside intelligence and a capacity for hard work) a small brine bath for making test dyeings, a few porcelain pots, some glass rods, and several other bits of miscellaneous apparatus. To the surprise of at least some "doubting Thomases" among the organization's executives, the new venture began not only to pay for itself, but to save many dollars per year for the mills and at the same time to better the quality of the company's products.

The result has been the only one indicated by such performance: expansion of the department's physical equipment, personnel, and activities, until today it is a unit staffed not by two young men, but by a group of some 50 men and women; a unit equipped not with a miscellaneous collection of apparatus, but with a scientifically correct group of machines and supplies, valued at many thousands of dollars, and permitting the carrying out of practically every kind of textile test.

Lessons Being Learned

Although the textile industry, as a whole, is rarely in the forefront in accepting new or radical departures in manufacturing policies and methods, yet there have been some organizations (as illustrated above) manned by men who saw the light. The lessons these manufacturers have learned regarding the value of laboratory control are the same lessons which other organizations may well learn. The advantages these mills have achieved may well be achieved by other plants engaged in textile activities, provided they too are willing to take progressive and aggressive steps toward the modernization of their manufacturing policies.

Is this trend toward precision through laboratory control likely to become a "must" of textile manufacture? Are there compensating factors which will help offset the expense of laboratory control? What do we stand to gain, in actual concrete form, if we adopt laboratory control in our mills? These are some of the questions thinking mill men will ask. Fortunately, definite examples and cold-blooded statistics are available in answer to each query.

Is the trend likely to become a "must"? Modern railroading offers a comparative answer. Hard pushed by the steady development of various forms of automotive transportation, the railroads have actually been forced to the adoption of research products—streamlining, air-conditioning, and others, with their accompanying advantages—in an attempt to win the consumer back from his new love.

Are there compensating cost-offseting factors? Automobiles here furnish the answer. The industry has invested millions of dollars in research and control facilities. The net result is seen in the vast number of cars on the road today.

Nor do we need continually to turn to industrial fields other than our own for answers to these important questions. For instance, the third one: What do we stand to gain from the adoption of laboratory control? The answer can be found by glancing at the statistics of the rayon industry. U. S. production has climbed from 364,000 pounds in 1911 to 277,626,000 pounds in 1936. And items appearing in TEXTILE WORLD during the past few months

indicate that more than ten million dollars is being spent on new plants, plant additions, and new equipment in this branch of the textile industry alone, in an attempt to step up production to meet the growing demand for consumer fabrics made of rayon yarn. These statistics, in view of the fact that rayon's very existence depends on strict laboratory control, form a strong argument for such control.

Functions of Laboratory

By what means, then, does the textile-plant laboratory function? How does it justify its existence—its claim to necessity? How can it make money for the individual mill, and how save it? What are its methods of operation?

In one sense a laboratory is to any textile plant what the proving ground is to the automobile manufacturer. Here processes and products are subjected to a rigorous course in hard knocks, in order to bring to light any inherent weaknesses, defects, or susceptibilities. But the true laboratory is more than a mere proving ground. It is an experimental station in which the new and unusual are accorded as much attention as the established or routined. It is a developing point for time-saving, cost-cutting, and product-perfecting methods and machines.

The actual tests which any particular laboratory may be called upon to make will vary, of course, with the type of product being produced. In a typical group of textile organizations, for example, questions asked of and answered by the laboratory have included the following:

Is the yarn we are receiving up to the standard specifications against which it was purchased? The laboratory, with strength tester, twist counter, balances, conditioning oven, and related equipment, can definitely decide. In one reported instance the spinner supplying yarn to a large weaving mill inadvertently spun an entire order of 25,000 lb. an average of two and a half counts coarse, thus greatly decreasing the actual yardage (but not the total poundage) delivered. The weaving plant's laboratory detected the error, and the spinner paid a short-yardage claim amounting to more than $1,300. In addition, the weaving mill was saved an even greater potential loss which would have occurred had the incorrect yarn been woven up into the fabric for which it was ordered.

Is Fabric Serviceable?

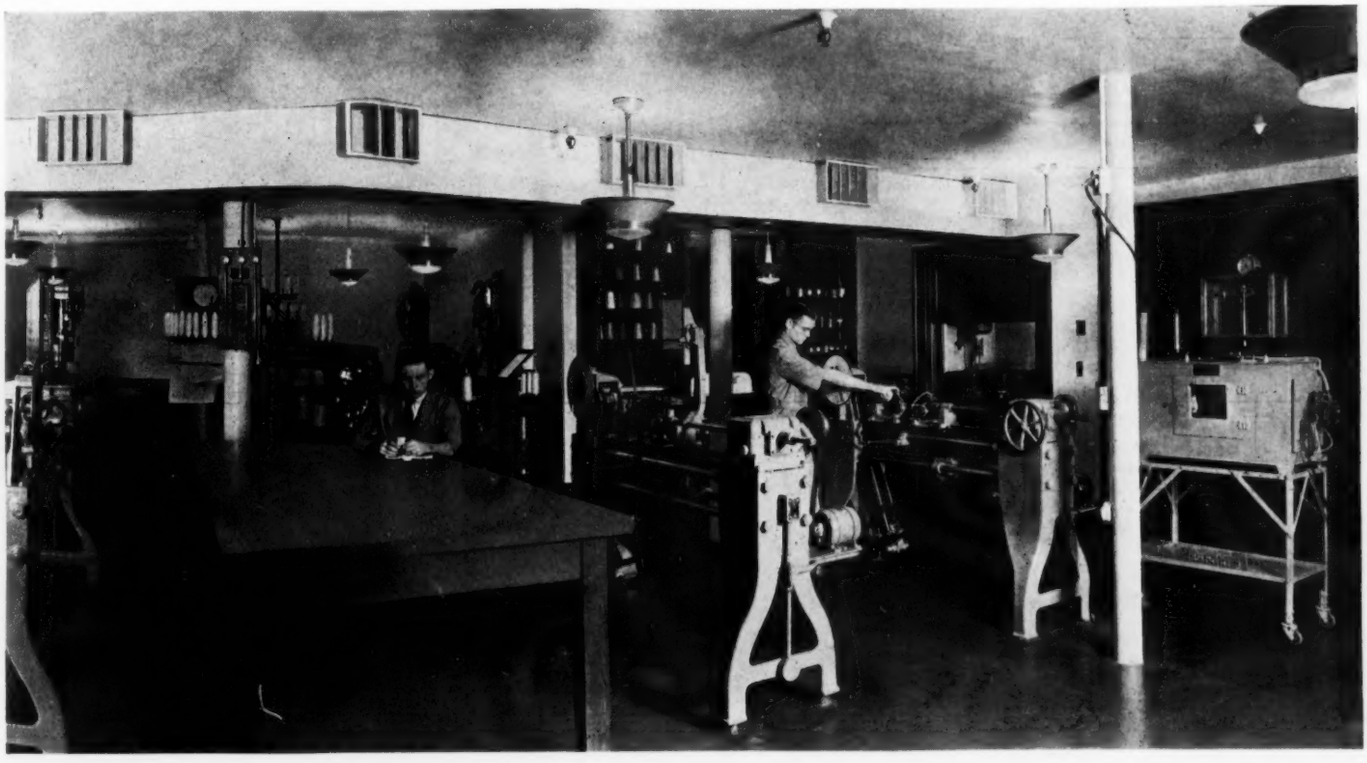
Will the fabric we are manufacturing prove serviceable? Will it stand up under rough usage? Here again the laboratory can determine, in a comparatively short time, just how much punishment a fabric will withstand. Using such apparatus as the Launder-ometer, abrasion tester, and fabric-strength tester, it becomes but a matter of hours, not months or years, to check on a cloth's wearability.

Do we get our money's worth on all dyestuffs purchased, or are there competitive products which would give us equal or better results at lower prices? Will the color of a particular fabric be fast to next summer's sun, or can we look forward to a lot of consumer complaints? The laboratory, by means of money-value, exposure-box, and Fade-ometer tests, can answer the question.

Are we processing our cloth in the most efficient manner, coincident with good results, low operating costs, and rapid production? The laboratory, by developing new processes and combinations of old, can reply. Laboratory study and control of finishing methods speeded one mill's production in this department from an approximate 10 yd. to 35 yd. per minute—and the experiment is being continued, aimed at even higher figures.

The predominating principle underlying all textile-mill laboratory control is this: We still have much to learn; and the laboratory offers the quickest, most accurate, and cheapest method for ascertaining those things which will benefit our particular plant and branch of the industry.

ONE OF INDUSTRY'S newest and best-equipped laboratories— that of Calloway Mills, LaGrange, Ga. Equipment includes three horizontal and four vertical strength testers, four twist testers, two drying ovens, two revolving conditioning racks, thickness gage, bursting-strength tester, distilling machine, inclosed weighing cabinet built on separate foundation, inspection-board reel, frosted-glass design-copying table, together with the necessary pick counters, spindle stands, yarn reels, templates, grain scales, hot plates, beakers, cabinets, etc. The laboratory is air-conditioned to exactly 65% r.h. and 70 degrees F. The analytical room, not shown, is likewise well equipped—with microscopes, balances, extraction tubes, and much other apparatus. Manager of testing is R. H. Adams, well known for his activities as a member of Committee D-13, of the American Society for Testing Materials.



PRECISION

THROUGH CONTROL INSTRUMENTS

HOW many of us are like the nurse who never used a thermometer to test the baby's bath? She didn't have to, you know, because if the baby turned blue, she knew the water was too cold; and if he turned red, she knew it was too hot.

Many textile operations are still run on this hit-or-miss basis, but the practice has been supplanted by scientific control for some of the more important processes in a goodly number of the larger mills.

Beginning with the raw material itself, for example, effort is now made to determine quality and spinnability by precise methods. With this object in view, several outstanding mills are testing the maturity of cotton by means of the polarizing microscope; the photo-electric cell is being applied to the testing of silk evenness; and—wonder of wonders — woolen and worsted men are beginning to look kindly upon the idea of measuring—yes, actually measuring—the fineness of wool. In a few years, we believe, the industry will no longer rely upon touch, sight, or any of the natural senses to determine the quality of raw fiber.

The subject of control by the laboratory is discussed in another article of this symposium on precision; and therefore this discussion will be confined to the use of instruments in the mill proper, excluding even twist counters and other laboratory-type instruments which for convenience are sometimes located in the production departments.

First Instruments

It would take a considerable amount of historical research to determine which were the first process-testing or controlling instruments used in the mill. Of course, Arkwright himself used simple media for measuring, weighing, and so on; but it is likely that the first scientific instrument which the mills adopted was the thermometer. This was probably first used for fixing the temperature of dyeing liquors before the goods were entered.

Most of us can't remember when lap scales of some sort were not used in the picker house. They must have come in about the time—and it was very early—that testing reels and grain scales began to make their appearance on benches along the walls of card and spinning rooms (the latter have since been moved into the laboratory); but the use of regain indicators in conjunction with lap scales is a fairly recent development.

The tachometer is old; but today we have the stroboscope, which enables us to determine the speed of spindles while they are actually twisting yarn, as well as to watch the behavior of various machine parts in motion. The stroboscope has lately been built into knitting machinery to facilitate the maintenance of uniform stitch drawing at all feeds. Perhaps only a step or so beyond the stroboscope is the slow-motion picture, which, however, has not been employed to any appreciable extent by mills, although used by machine builders.

For Maintenance of Machinery

One important yardstick of a machine's operation is the comparative power it consumes, and this can be determined definitely by means of a portable graphic wattmeter. This instrument or a set of ammeters, voltmeters, and so on, can be used to determine whether motors are overloaded or underloaded; and in most cases the application of these instruments does not require the breaking of circuits. Friction losses and the efficacy of lubrication can be tested by means of electrical instruments, and of course they can be put to valuable use in determining power factor of various circuits throughout the mill.

In aligning and leveling machinery, surveying instruments have been useful; but today there is available a special set of instruments for overhauling roving and spinning frames, spoolers, twisters, and winders. Dial gages mounted on specially designed supports are also helpful, as has lately been proved in the case of full-fashioned hosiery machines; and instruments are available for testing the uniformity of knitting needles, sinkers, and other small parts at the flick of a lever. An instrument which is receiving growing recognition is the vibration meter.

For Machine Settings

One of the most interesting and tradition-breaking of the instruments which have arrived in the textile mill in recent years is the roll-spacing determinator, a device which eliminates guesswork in the setting of drafting rollers and which has already shown that the spinner's judgment concerning this setting has seldom been accurate over the nearly two centuries that the principle of roller drafting has been employed.

Yardage clocks are old and pick counters fairly so, but now we have density meters for determining whether packages are wound too hard or too soft; tension meters for showing the pull on a yarn—say on a winder or as warp in a loom; and let-off recorders to show how satisfactorily a loom is feeding its warp. We also have hosiery-inspecting machines which automatically draw the line between objectionable and unobjectionable rings.

For Room Conditions

When artificial humidification was introduced to the industry, the hygrometer and sling psychrometer became essential. More recently, the so-called hygrostats, humidistats, etc., for controlling humidity and temperature automatically have become recognized as the only satisfactory means for maintaining uniform atmospheric conditions.

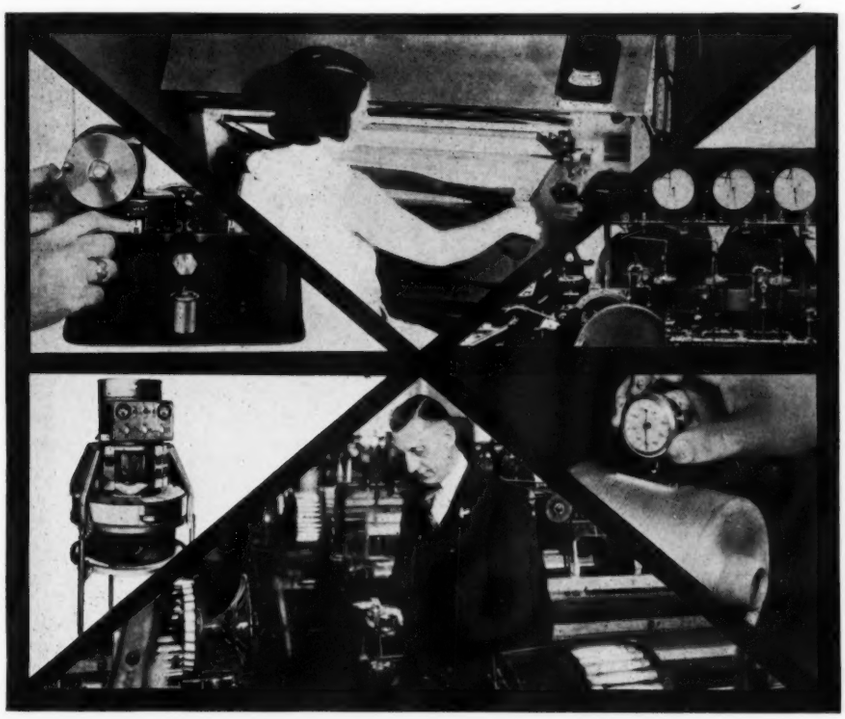
It is only recently that the light meter has been applied to any appreciable extent to mill work; but today it is possible to control illumination automatically by means of photo-electric cells located at strategic points throughout departments.

In sizing, bleaching, dyeing, and other wet processes, temperature, time, and concentration are the three most important conditions which must be controlled. A difference of only a few degrees in the temperature spells the success or failure of many operations. A slight variation in the temperature from one side of a machine to the other is often the cause of uneven dyeings. The thermometer in one form or another is, therefore, the most useful and the most widely used of all instruments in wet processing of textiles. The finger and the eye of the

master dyer of yore gave way to the hand thermometer as a more precise method for determining temperatures. Then, in 1875, came the invention of the first recording thermometer and the development later of automatic temperature-controllers. Today there are at least 65 different textile operations in which instruments for indicating, recording, and controlling temperature are in more or less common use.

Length of time to which textiles are subjected to various chemical treatments is still determined largely by means of the ordinary clock or watch or by noting the number of "ends" or "passes" the material makes through the liquor. The present trend, however, is to reduce the chance of human error by use of mechanisms which stop the machine or give a signal after a predetermined period of time has elapsed.

Just about 25 years ago the automatic time-temperature-cycle controller made its debut and since then has come more and more into favor in wool dyeing and other processes where it is essential to maintain the temperature at one point for a certain length of time and then, in a given number of minutes, raise or lower it to some other point.



For Concentration

Establishment of proper initial concentration of solutions requires the use of scales and fluid measures. For maintaining the desired concentration throughout the operation, the hydrometer (often supplemented by chemical tests) remains the favorite tool. Recording densimeters and instruments which give automatic control of specific gravity are available, but as yet are not widely used.

Likewise, textile men have been slow to adopt proportioning chemical feeds and similar devices which assist in maintaining a uniform concentration. This type of instrument is proving advantageous, however, in water purification and a few other applications, and undoubtedly will be more widely adopted in the near future. Acidity and alkalinity, usually controlled by titration methods, can, in many instances, now be regulated more satisfactorily by means of pH recorders and controllers.

For many years the measuring stick and the liquid-level gage have been commonly employed for determining and maintaining the desired volume of liquor in dye vats, tanks, and other equipment. Now automatic liquid-level controls are proving their worth in numerous applications.

How to obtain a uniform, predetermined moisture content in textiles leaving a dryer has been one of the vexing problems of the industry. Instruments developed within the last two or three years give promise that this difficulty will soon be overcome. Automatic control of steam pressure in kiers, dryers, package dyeing machines, and other equipment is almost universal. In recent years flowmeters have been widely adopted for measuring the amount of steam consumed in various processes.

There is a growing realization of the importance of mechanical pressure in wet processing, and, with it, an increasing use of pressure-regulating devices on fulling mills, mangles, and other machines where the goods pass through squeeze or nip rollers. Likewise, instruments for measuring the density or hardness of rollers are contributing to our understanding of just what type of roll is most suitable for a specific purpose.

In the dyehouse, the daylight lamp aids in the matching of shades. The spectrophotometer, today used only in the laboratory, may tomorrow be applied to plant-control work.

Complete Instrumentation

No attempt has been made to list each and every type of instrument employed. Rather, the aim has been to indicate how instruments can make for precision in mill operation. That progressive textile men are aware of these benefits is evidenced by the tendency, particularly in wet processing, toward complete instrumentation to give automatic control of all the variables in a given operation. On warp sizing machines, for example, one may find a time-temperature controller on the size kettle, a temperature controller and liquid level controller on the size box, a temperature controller on each dry can, a moisture-content controller to insure uniform regain in the dried yarn leaving the cans, a stretch-control device, and measuring clocks.

To Check on Operatives

Instruments are being applied to operatives, as well as to machines. The stop watch offers the most common example; but even applicants for jobs are being tested by various means for dexterity, muscle control, color blindness, ingenuity, and other traits.

One of the most recent developments is an instrument which gives a continuous record of machine operation, showing at a glance the total time operated and the number of stops and duration of each. This instrument replaces the stop watch in making time studies, and, when a routine is established, permits the foreman to know instantly whether or not the routine is being followed by the operator of the machine. This type of instrument has already proved useful in weaveroom and dyehouse control work and, apparently, has numerous other applications in textile manufacturing and finishing.

The nurse who told the temperature of the baby's bath by the color of the baby would not be tolerated in the modern home. In the modern textile mill the fireman would not last long who, taking it for granted that all is well so long as no smoke is pouring from the chimney, fails to make use of CO_2 recorders, draft regulators, and other control equipment. In every department of the up-to-date mill, and in the power plant, instruments are pointing the way to lower costs and bigger profits through precision methods of operation.

PRECISION THROUGH SYSTEMATIC MAINTENANCE

By H. McKelvie

AN overseer of twisting was sure he could reduce to a minimum the spindle-speed variations, spindle drag, etc., on his heavy twister spindles. All he needed, he said, was his trained eye and his years of experience. After doing his very best, he was astounded to see the results brought out by a stroboscope. A man was then selected, trained in the use of this instrument, and trained to make adjustments and repairs as he found the defects. The result was better quality, greater uniformity, lower maintenance, and reduced power per pound of goods produced.

An old spinner made the statement that he could line, level, and adjust his spinning frames just as well with conventional methods as with precision methods. He was instructed to overhaul several frames. When he was satisfied with the work, the Guillet system of overhauling was applied to the frames and it was discovered that some roller stands were out as much as $\frac{3}{16}$ in.

The lineshaft in a card room was giving considerable trouble. Excessive power was consumed, couplings and pulleys slipped, one of the shafts crystallized and wrung in two. The bearings were overhauled, the shafting lined and leveled, couplings trued, and pulleys tightened. The result was reduced power, more production, and lower maintenance cost. Now systematic inspection and maintenance prevent the old condition from developing again.

These are just a few of the examples which might be cited to show that systematic inspection and maintenance pay dividends.

Precision through systematic inspection and maintenance revolves about one fundamental principle—not tools, not instruments, not reports—but *men*. The plans formulated, information compiled, and records collected must be made actually to live through men who should be very carefully selected and trained by consistent and persistent effort. And it should be realized that any successful inspection or maintenance program must be based primarily on *prevention* rather than *cure*.

There are two basic methods of inspection and maintenance. One is periodic and requires the hiring of additional experienced men under the direction of the regular supervision, the contracting of overhauling to outside concerns, or a combination of these. The other method involves continuous inspection and maintenance through permanent organization.

FOUR essentials of a systematic inspection and maintenance plan, as outlined by Mr. McKelvie:

1. **Detailed instructions and records.**
2. **Careful selection of instruments.**
3. **Schedule of inspections and repairs.**
4. **Precise delegation of responsibilities.**

There are benefits and weaknesses in both systems. A number of organizations have found that continuous inspection and maintenance are better, since excellent results are obtained at a minimum cost. The regular maintenance force is used, receives the benefit of the inspections, and gains by the experience in rectifying troubles. This experience makes them more alert in their daily routine, thus gradually reducing glaring faults to a minimum.

Equipment purchased is a strong link in the chain of successful maintenance. It is not necessarily true that the most expensive equipment is the best, nor is it relatively true that low-cost equipment is ultimately the cheapest. Careful and judicious selection of new and replacement equipment is essential.

After an inspection and maintenance routine or system is set up, a very effective check on its working may be had by rigid supervision of purchases involving supplies and repairs. After sufficient experience, budgeted allotments may be designated according to pounds produced, spindle hours, or some other convenient basis. If purchases exceed allotments, then there is some special reason or the inspection and maintenance set-up is not functioning. This calls for a thorough check in the item involved and the bringing of forces to swing the organization into line.

Certain essentials are involved in the attaining of precision through systematic maintenance and inspection. These may be briefly summarized:

1. A detailed plan and set of records to fit the plant in question. The details should be so developed that each machine, lineshaft, motor, etc., is analyzed just as a doctor makes his physical examination of the human system. This should be kept as simple as possible—the main thing is to make an accurate, speedy inspection and, if necessary, to repair the apparatus promptly. Only essential records should be retained, and these should bear the signature of the man making the inspection and repairs.

2. Instruments should be carefully selected and furnished. These include electrical meters, speed indicators, micrometers, gages, vibration meter, stroboscope, lining and leveling devices, etc.

3. The time element is important. Some equipment should be inspected and maintained weekly, some monthly, and some yearly. It is therefore necessary to draw up a program indicating the frequency of inspection and maintenance for each group of equipment. This program may be modified from time to time, depending on experience.

4. If possible, make the man responsible for quality, operation, production, efficiency, and cost also responsible for inspection and maintenance. This approach spreads over a number of departments and among a number of men what would otherwise appear to be a huge task. It also concentrates responsibility. For example, the engineer or master mechanic should be responsible for the electrical, mechanical, and building inspections and maintenance; the overseer of carding for the condition of his machines, their inspection and overhauling; and so on through the organization. The management should by all means keep a close check on the various departments. Remember—penciled reports neatly kept in the overseers' offices and periodically analyzed by the management are more valuable than finely typewritten and voluminous reports filed away by some clerk.

PRECISION THROUGH MODERNIZATION

IN most instances the primary objectives of textile mill modernization are to increase production and to decrease costs. Usually the word "precision" is not even thought of in conjunction with a modernization program. But precision operation of any type of textile mill is impossible with obsolete or worn equipment, and—directly or indirectly—every move which is made to bring the plant up to date is a step toward greater precision.

During the last year the textile industry has done some real stepping. It has spent over $100,000,000 for new textile machinery alone—the majority for replacement purposes. It has spent other millions on equipment for air-conditioning, lighting, water-purification, materials handling, and power transmission. It has spent still more millions in building new power plants and in revamping mill buildings. Several individual companies have embarked on modernization programs, each of which will call for expenditures running from $100,000 to $500,000. Every branch of the industry and every section of the country has awakened to the need for and value of modernization.

There are several ways in which one could show how use of up-to-date machinery makes for precision in textile operation. It would be possible, for example, to write at length of the improvements and refinements which have been made in various types of equipment. Again, it would be possible to discuss oilless bearings, cut gears, antifriction bearings, variable-speed drives, group drives, individual-motor drives, automatic lubrication, aluminum, stainless steel, and similar developments.

Instead of anything of that sort, we decided it might be more interesting to see just what mills have been doing in the last year or so in the way of modernizing. And so we thumbed through the 1936 volume of TEXTILE WORLD to determine the most important trends in modernization. Without further ado, we shall let our findings speak for themselves.

Cotton Manufacturing

In the cotton-manufacturing industry, modernization of the spinning room is receiving the lion's share of attention. Mill after mill, particularly in the South, is replacing old frames with the latest type of long-draft spinning or applying long-draft units to equipment otherwise in good mechanical condition. One plant alone has, in the last few years, installed over 90,000 long-draft spindles; numerous others reported installations in 1936 running all the way from 10,000, 30,000, and 40,000 to 65,000 spindles. Today there are around 7,000,000 long-draft spinning spindles in the industry, of which more than a million were installed in 1936. Practically every mill spinning coarse or medium counts has installed long-draft spinning, is about to, or else is financially unable; and a good proportion of recent installations have been in combed-yarn mills. Now comes long-draft roving, with already thousands of spindles in coarse-yarn mills and thousands more to be installed this year.

Wide-gage, large-package spinning frames are being adopted more and more. Trial installations of various types of variable-speed spinning equipment continue to be made. For leveling and aligning new frames and frames already in place, many mills are turning to systematic overhauling systems.

In the weave room, old looms are being junked by the hundreds and thousands to make way for new higher-speed automatic looms. In this connection should be noted the continued trend toward 40-in. looms, rather than the narrower machines favored in the past. In the effort to obtain higher loom speeds and more positive operation with group drive, several mills have made trial installations of the latest modification of this method of power transmission—the Energy drive. Other plants have turned to individual-motor drive.

Our mill notes of the year disclose that picker rooms are being brought up to date by installation of one-process picking, blending reserves, lattice openers and cleaners, and oil-spraying equipment. It is evident also that the strong trend toward the use of high-speed spoolers and warpers continues, and that vacuum dust-and-lint-collecting systems are finding greater favor. Controlled-draft drawing is on the increase.

While a large percentage of the modernization work has been along the lines noted above, the notes also show considerable progress in other directions. This includes installation of the latest types of card-stripping devices, combs, traveling cleaners on spinning and spooling, large-package twisters, high-speed winders, improved slashers, filling feelers and thread cutters, and shears and other cloth-room machinery.

Old equipment comes out to make room for new

A development of the year which has interesting possibilities is the completion by a southern cotton manufacturer of an experimental mill to be used for research and development work.

Wool Manufacturing

Aside from the modernization of dyeing and finishing departments and power plants, which will be commented on

later, woolen and worsted manufacturers have devoted most of their efforts to the revamping of their spinning and weaving departments. In a few notable instances comprehensive modernization programs have been inaugurated, which, when completed, will have cost upwards of $500,000 each; but installations of ring spinning frames and of automatic looms are easily the outstanding trends. Mention should also be made of worsted metallic carding, intermediate broad - band woolen-card feeding, tape condensing, hot-air backwasher drying, Bradford intersecting gilling, high-speed worsted roving, woolen ring spinning, worsted ring spinning, variable-speed spinning, high-speed jack spooling, and high-speed dressing. A recent development which may prove of importance this year is the large-package mule.

Silk and Rayon

Throwsters of silk and rayon are replacing and revamping old equipment to give higher spindle speeds, to accommodate larger packages, and to give package-to-package operation. Trial installations have been made of three or four different types of throwing equipment of radically new resign. Tub soaking of rayon is giving way to machine methods.

For conditioning and twist-setting, many mills have installed one or another of the special machines developed for this purpose. Likewise, a number of companies have discarded old weaving equipment and put in modern silk and rayon looms. High-speed warpers are superseding the models previously used.

Knitting

All branches of the knitting industry have paid considerable attention to modernization, although a good part of the productive machinery installed has been for expanding plant capacity, rather than for replacement purposes. In the full-fashioned field the trend toward finer gages has continued. A typical example is a mill which recently got rid of its 42-gage machines and doubled the number of its 51-gage. Many new half-hose machines having a higher design capacity were installed. Quick-pattern-change machines for outerwear and underwear are taking the place of older types of equipment. New ribbers of unusual design capacity have been extensively adopted for bathing-suit manufacture. Several hosiery knitters, who previously did no dyeing, have added modern dyehouses; and one company has equipped a complete experimental and research department.

Finishing Division

After a long period of no profits, cotton finishers in 1936 were able to start the job of revamping their mills and equipment to meet present-day conditions. The story of what they are doing was told at considerable length in our November issue and need not be repeated here. This holds true also of trends in the modernization of yarn processing and knit-goods finishing.

In the silk and rayon finishing division, the majority of companies were still unable to inaugurate anything like a comprehensive modernization program. Even in that branch, however, there has been a considerable amount of new equipment installed, practically all of it being of the latest types for processing rayon and acetate fabrics.

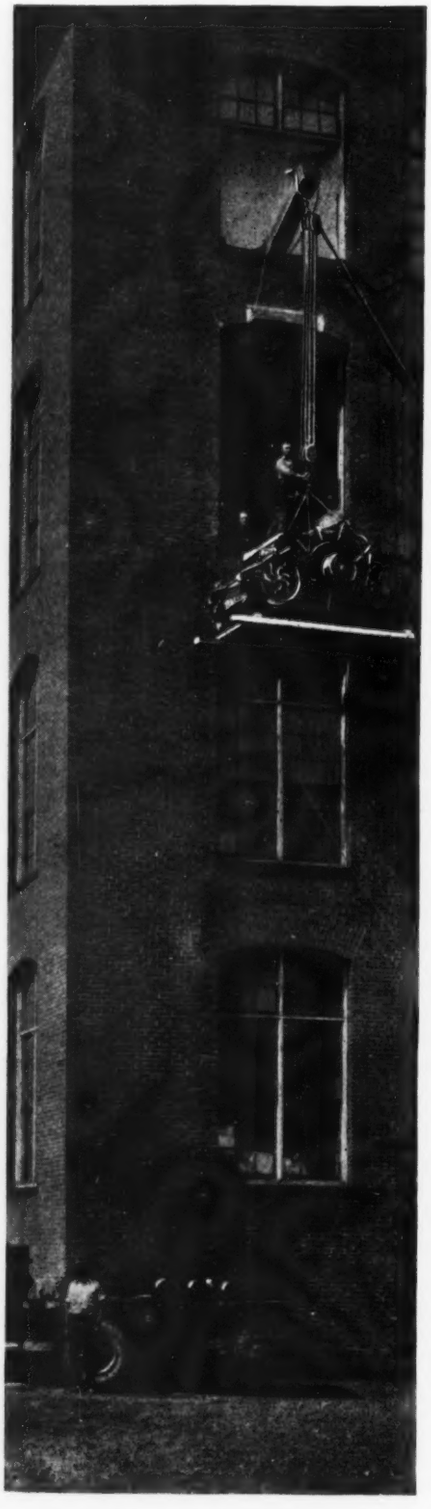
Over a period of five or six years the noteworthy improvements in fulling mills, dyeing machines, washers, carbonizing, machines dryers, etc., have rendered obsolete a very high percentage of the equipment formerly used in finishing wool goods. For a long time the most backward section of the industry as far as regards use of modern machinery, the finishers of woolens and worsteds suddenly woke up to the fact that their plants and machinery were in a deplorable state. As a result, no branch has been more active in revamping the mills and installing the latest types of machinery.

Engineering

In the engineering field modernization work has consisted of everything from re-roofing of mills to the erection of complete new power plants. The following list, while by no means complete, will indicate some of the major trends: installation of new air-conditioning, ventilating, lighting, and water-purification systems; erection of dikes for flood prevention; electrification of mill throughout; supplanting water power with electric generators; revamping of piping systems and addition of heat-reclaiming systems; expansion of machine shops; renovation of mill village; installation of conveyor systems; and replacement of glass with glass-brick windows.

Four years ago in these columns it was shown that scrapping of obsolete machinery would result in an annual saving of $159,000,000 a year. The modernization work of the last twelve months is evidence that the industry is out to make that saving.

NOT FOR expansion, but chiefly for replacement, the textile industry has spent more than $100,000,000 in the last twelve months on new textile machinery alone; other millions for auxiliary equipment and modernization of buildings.



EASTMAN'S DENIER CONTROL MEANS *BETTER CLOTH*

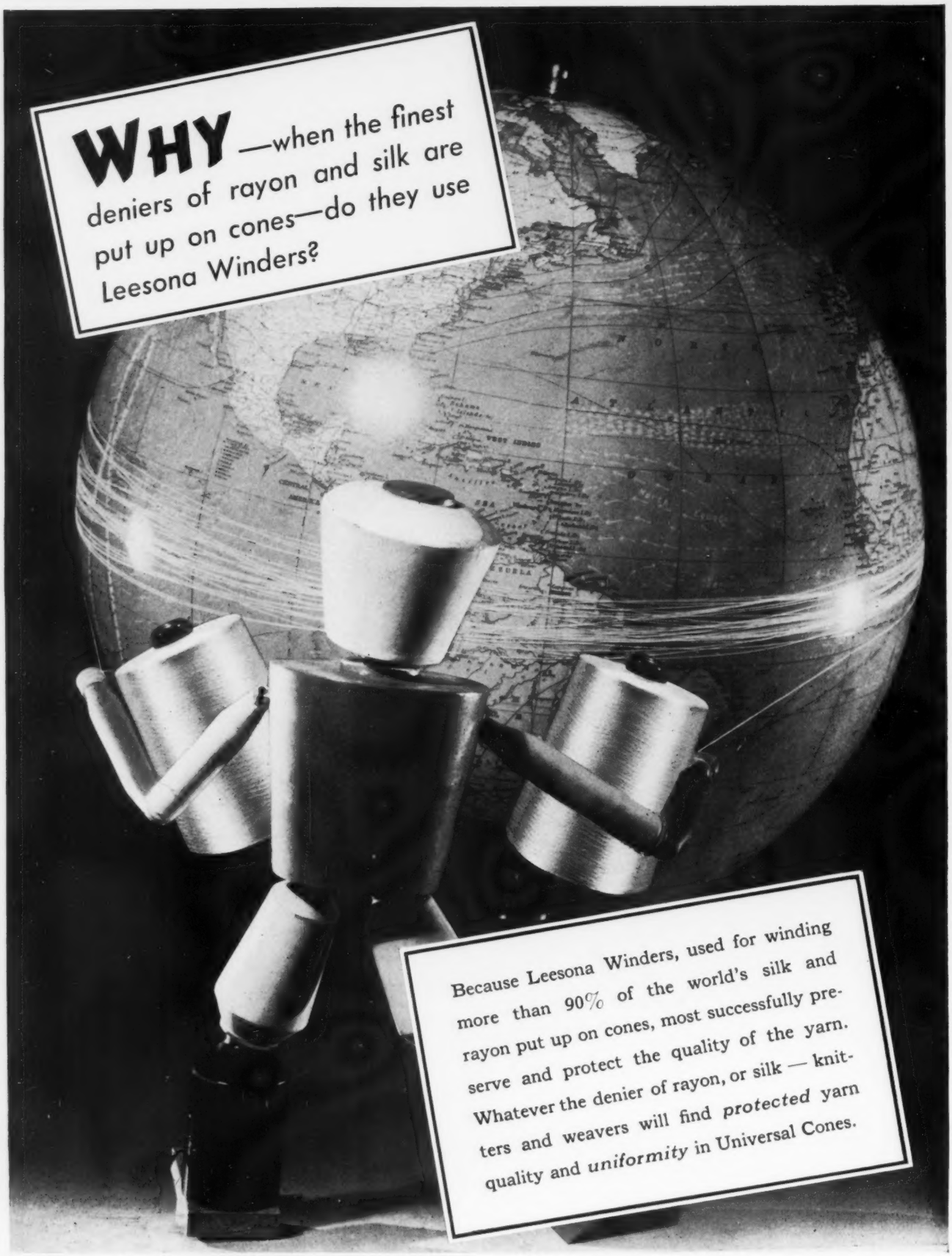
This is the test that helps eliminate warp streaks and filling bands in woven cloth. Every day at the Tennessee Eastman plant samples of yarn from production are skeined and placed on this balance. If the pointer indicates correct denier then the yarn is uniform and ready for delivery. If the pointer shows a denier outside of the specified narrow tolerances the yarn is graded out.

Such a guarantee of uniformity is invaluable to the weaver. He knows that when he buys Eastman Acetate Yarn he will get the yardage consistent with his order. He also knows that this technical perfection of Eastman Yarn, always safeguarded by denier control and other laboratory tests, does away with a lot of his weaving troubles and results in a finished cloth of superior texture. It has placed fabrics of Eastman Yarn in the leading dress houses and department stores throughout the country.

•

A. M. Tenney Associates, 171 Madison Avenue, New York City. Sales representatives for the Tennessee Eastman Corporation, subsidiary of the Eastman Kodak Company.

EASTMAN ACETATE YARN


WHY—when the finest deniers of rayon and silk are put up on cones—do they use Leesona Winders?
Because Leesona Winders, used for winding more than 90% of the world's silk and rayon put up on cones, most successfully preserve and protect the quality of the yarn. Whatever the denier of rayon, or silk — knitters and weavers will find *protected* yarn quality and *uniformity* in Universal Cones.

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BOSTON NEW YORK PROVIDENCE SPRINGFIELD UTICA CHARLOTTE ATLANTA

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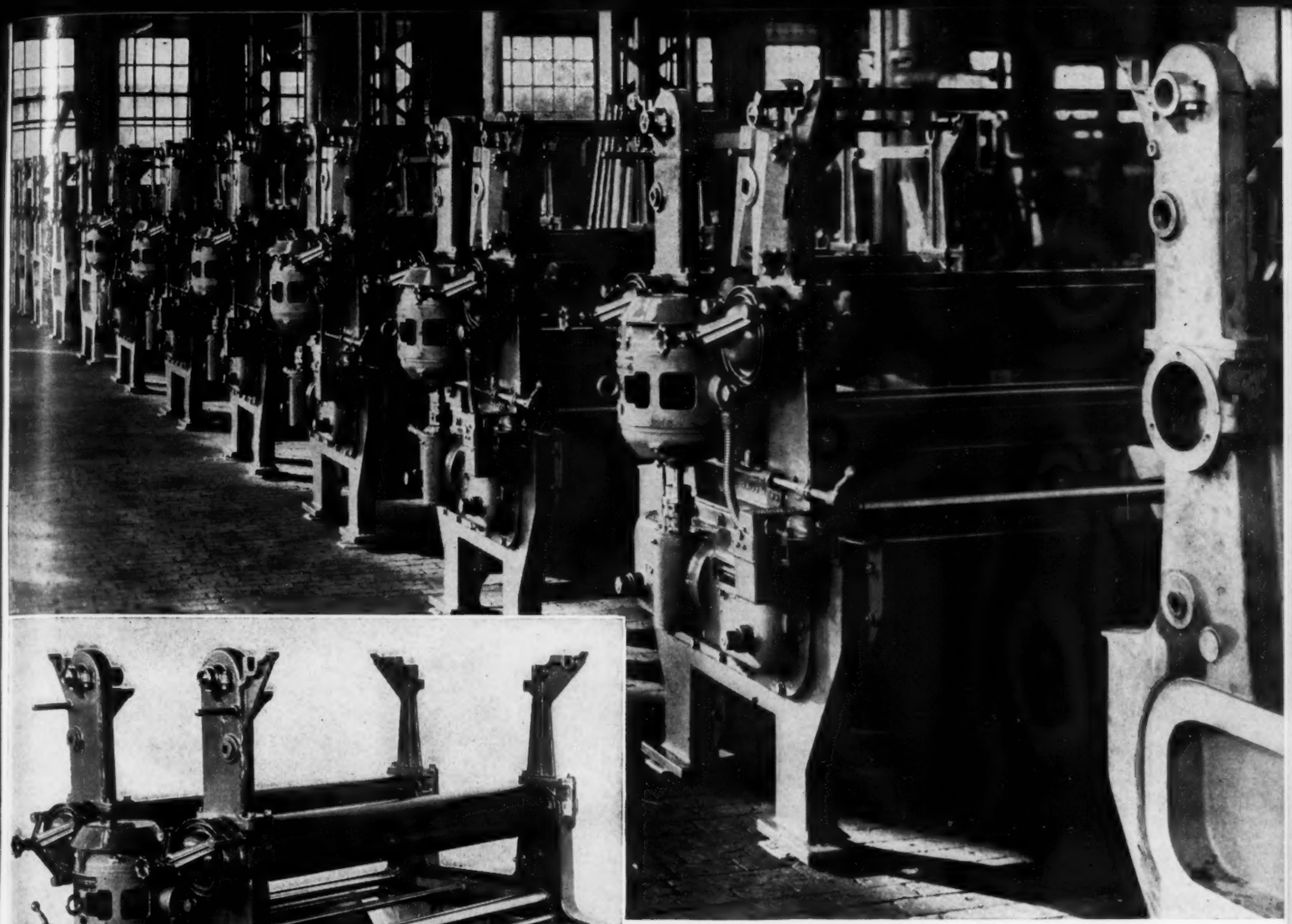

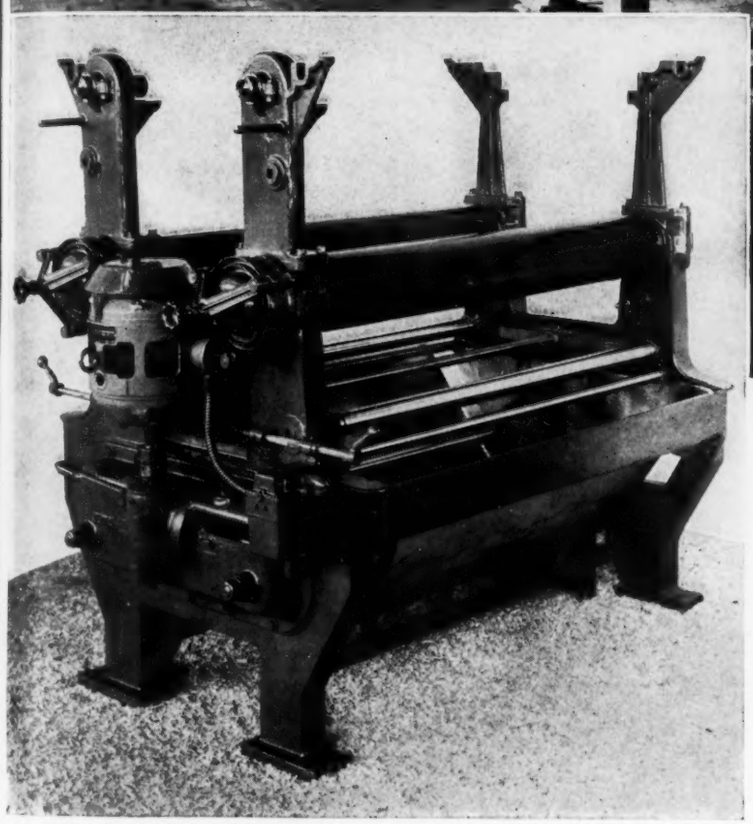

Unretouched photographs. Above: A battery of Van Vlaanderen Tensionless Dye Jigs that are being rushed to completion to fill current orders and recorders. LEFT: Close up showing sturdy construction of this machine.

THE NEW DYE JIG THAT IS REALLY TENSIONLESS

Progressive plants, specializing in highest quality dyeing, are using an increasing number of these dye jigs because they have found it gives excellent results on acetates and other synthetic fabrics that are harmed by tension. It allows the use of higher temperature dye liquor without distortion. Result: better quality and faster production.

This machine can do a real job for you. It is truly tensionless—both rolls are driven. It also is designed to give constant cloth speed. If desired, automatic stopping and reversing equipment is available. There are definite reasons for the popularity of this machine. You should have full information and see it at work.

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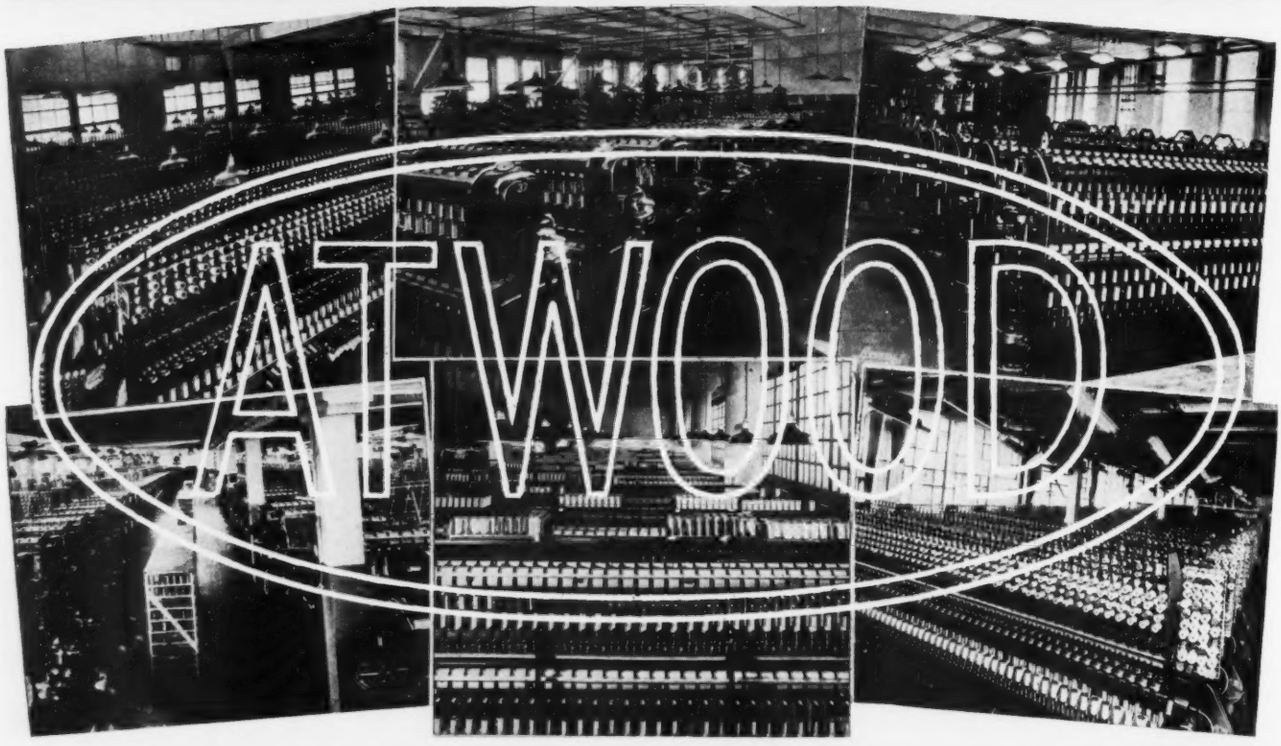

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Good Times Are Here Again!

Declared cotton manufacturers, who saw real profits in 1936

THERE is no use repeating that 1936 was one of the most remarkable years ever experienced by the cotton-textile industry. First, there was invalidation of the AAA processing tax, long a thorn in the flesh of manufacturers. Then came a period of relatively unprofitable operation (though at a high rate) which lasted until midsummer. Suddenly, in July, cloth and yarn margins began to widen substantially, and the already high rate of activity picked up even more.

The upward trend had begun, and by midfall there appeared to be a mild "boom" in cotton goods. Everyone held his breath waiting for the inevitable reaction, but, strangely enough, it didn't come. Manufacturers grew bolder, and their confidence was reflected in rising markets. Overnight, a long-standing buyers' market became a sellers' market for the first time in years. What happened after that is history. There was a general 10% upward adjustment of wages, and the year ended with mills going full blast, and sold months ahead. What the future will be is problematical. There is no doubt that 1937 will be a good year for cotton textiles, but some of the more conservative mill operators fear reckless operation is going to bring "good times" to an end earlier than necessary.

Monthly cotton consumption in the United States averaged better than 591,000 bales, over 20% more than the previous year. From July through December, consumption ranged upward from 607,000 bales to 693,000 bales, with the exception of August when the figure dropped to 574,000 bales. High month was December with 693,000 bales, and low month was February with 516,000 bales. Over 7,096,000 bales utilized by domestic mills, plus 5,410,000 bales exported, brought the total of American cotton going into consumption to about 12,506,000 bales, according to preliminary reports.

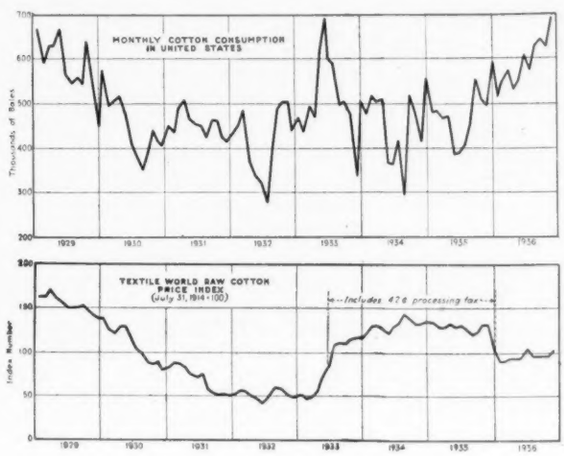
Exports of cotton began to decline in early spring, and hit bottom in July with 156,000 bales. The second lowest month was August with only 182,000 bales. Primary reason for this decrease was a shortage of certain staples for several weeks before the 1936 crop came in. This shortage was relieved when the new crop began moving, and exports jumped to 570,000 bales in September, and to an all-year high of 861,000 bales in November. Exports averaged 450,000 bales per month during the year, as compared with 487,600 bales the previous year, a decrease of 8.0%.

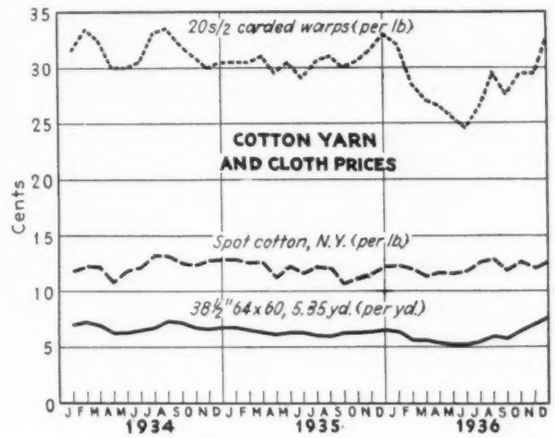
Prices of raw cotton, based on the behavior of New York spot cotton during the year, fluctuated in the range of 2.45c., from a high of 13.65c. in August to a low of 11.20c. in April. Monthly average for the year was 12.07c., as compared with 11.87c. the previous year, a gain of 0.20c. Over 11,900,000 bales were ginned prior to Jan. 16, 1936, as compared with 10,248,191 bales prior to the same date in 1935.

Spindle activity by months, closely corresponding to fluctuations in cotton consumption, was at an average of 116.7% single-shift capacity, as compared with 91.0% for 1935, an increase of 25.7%. The average number of spindles active per month was 23,379,000, as compared with 23,422,000 in 1935, approximately 43,000 or 0.2% less. Average hours operated per spindle in place were 270 as compared with 209 the previous year, an increase of 61 hours per spindle, or 29.2%.

Cotton-textile mills made money in 1936, especially during the second half of the year. The Federal Trade Commission's semi-annual report on profits and losses showed that during the first half of the year the average rate of return on textile investment for various types of companies was as follows: 113 spinning, 2.77%; 67 weaving, 1.76%; 264 combined spinning and weaving, 2.55%; 77 commission dyeing and finishing, 3.75%; 18 thread manufacturing, 3.94%. A group of 10 stock dyeing and finishing companies investigated reported a loss of 0.15%. The report for the second half of the year had not been issued at this writing, but from statements of individual mills, it is safe to prophesy that earnings were much greater during the second half, and that losses were negligible. Dividends were paid freely during 1936, and there was much trading in textile securities, some of which advanced in value as much as $30 to $50 per share.

The year ended with a strong note of optimism in the prices of cotton fabrics and yarns, although the monthly averages for 1936 were somewhat lower than for the previous year. Closely paralleling the price of raw cotton, basic prices gradually declined during the spring months until a general low was reached in June. For example, 38½-in., 64x60, 5.35 print cloth dropped from 6⅜¢ in January to 5¼¢ in June, and 10s frame-spun carded yarn declined from 29½¢ to 22½¢ during the same period. From that time on, however, the rise in prices was continuous, and the year closed with the print cloth selling at 7 9/16¢, and the yarn at 28½¢.


MONTHLY COTTON CONSUMPTION IN UNITED STATES
Thousands of Bales
TEXTILE WORLD RAW COTTON PRICE INDEX
(July 31, 1914 = 100)
Index Number


20s/2 carded warps (per lb.)
COTTON YARN AND CLOTH PRICES
Spot cotton, N.Y. (per lb.)
38½" 64x60, 5.35 yd. (per yd.)
Cents
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1934
1935
1936

A Million More . . .

Long-draft spinning spindles, with continued development of long-draft roving—Other advances

By Horace L. Pratt
Shawmut Mill Division, West Point Mfg. Co., Shawmut, Ala.

WHILE no radical changes in cotton manufacturing methods were made during 1936, a number of minor refinements appeared; and these will be touched upon briefly in the course of this summary. Improved market conditions, however, enabled many mills to cash in on their previous investments in one-process picking, long-draft roving and spinning, high-speed spooling and warping, improved automatic weaving, etc. Also, because of legislation designed to discourage large surpluses, a number of mills preferred to improve their position by the installation of more modern equipment. This trend should continue, and the year 1937 will no doubt be a busy one for the builders of textile machinery.

Raw Cotton

More attention is being given to the raw cotton. Mill men are wondering what bearing the Rust cotton picker will have on the quality of the cotton they will receive. Leaf and trash are very hard to remove; and all mechanical harvesters so far tried out gather a great quantity of leaf, trash, pieces of stalks, and immature bolls.

Recent progress in ginning methods is attracting attention. A method of drying cotton before ginning has been found by experts of the U. S. Department of Agriculture to improve the cleanliness and staple of the cotton to a marked degree. The writer, who spent his early days on a cotton farm, recalls that his father preferred to pick his cotton, store it in the barn, and let it "dry" before ginning, rather than carry it directly from the field to the gin.

Tests are being conducted on the structure of the cotton fiber which may throw new light on problems in sizing, finishing, and dyeing.

Opening, Picking, and Carding

Opening and picking continue to receive attention. A number of different ways have been developed recently to permit recirculation of air in picker and hopper rooms. A new condenser for this purpose, introduced in 1936, filters the dust-laden air from the machines and returns the same air—dust free—to the room. These developments make humidification of the picker room feasible, a thing that was hardly possible when approximately 1,500 cu.ft. of air per minute was exhausted by each picker fan under the old system. With this new condenser the dust house can be dispensed with and the dust collected in containers which may be emptied periodically as circumstances demand.

Other improvements in the picker room include a color-blending unit for one-process picking and a new type of evener-belt shipper.

Changes in the card room have not been so marked, but experiments are still being made with a view to eliminating more processes and applying long draft to roving. This year may see further use of control-draft drawing, a feature that is receiving considerable notice.

Spinning and Twisting

Many experiments have been made during recent years toward finding a better roll covering than leather, or at least a satisfactory substitute. Covers made of cork are enjoying wide use. Rubber-covered rolls have been tried, but not with the success that the makers had hoped.

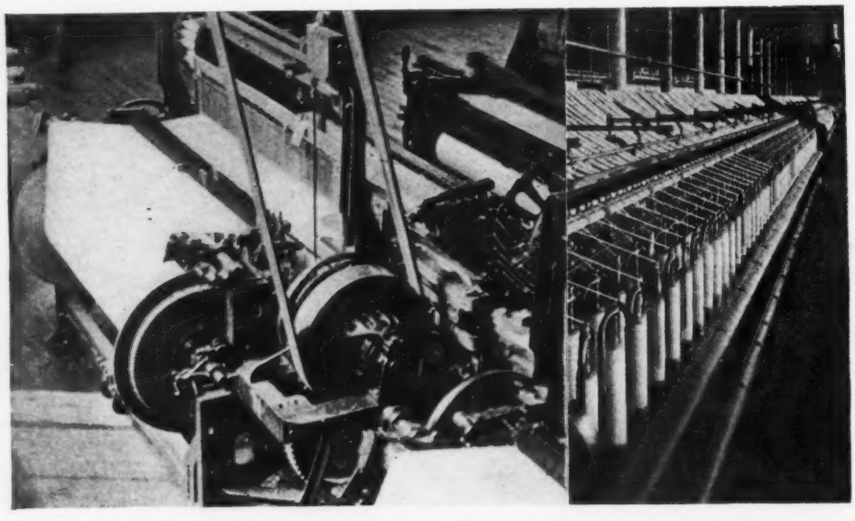
However, during the year 1936, two manufacturers placed on the market covers made of synthetic, rubber-like materials. These new rolls have been undergoing severe tests for some time, under the supervision of their respective makers, who feel that they have something that will be a boon to the spinner.

Experiments toward the improvement of variable-speed spinning continue to be made.

It is estimated that there are now well over 7,000,000 spinning spindles operating on long draft, at least a million more than there were a year ago. All new spinning frames purchased are equipped for long draft, and it is interesting to note that a large proportion of the change-overs in 1936 were made in the combed-yarn group, the last division of the industry to be won over to the new system.

The question of humidity in the spinning room and its effect on the size and breaking strength of yarn has been receiving more attention. Some of the mill men, in their technical meetings, have been discussing the advisability of running humidifiers over week-ends.

A self-lubricating twister ring seems



The new flywheel-pulley or "Energy" drive applied to a cotton loom — *A recent installation*

to be the solution to certain problems in the twisting room. The makers of this ring claim that the spindles may be run at higher speeds and that grease at this point is eliminated.

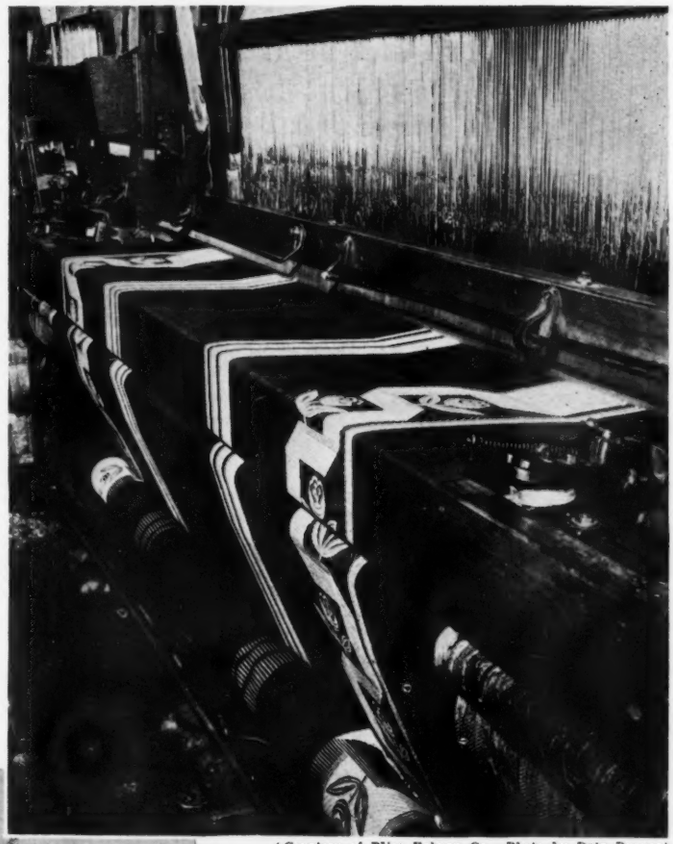
Winding, Warping, and Slashing

Nothing unusual in the way of new warp-yarn winding or warping methods seems to have been brought out last year, but the general acceptance of the greatly improved winders and warpers that have been offered in recent years continues. This is true of the high-speed automatic spoolers also.

Some improvements in filling winders are worthy of study, especially with respect to the bunch builder for automatic looms. Makers of filling winders claim that, because of the greater length of filling to the bobbin and, for certain types of filling, the "mechanical inspection" possible on the filling winder, the process is profitable to the mill.

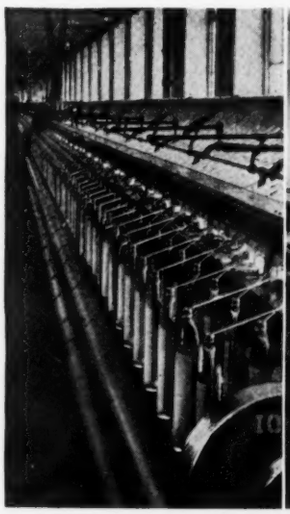
The slasher room, sometimes called the bottleneck of the mill, has been the subject of more study. Progress continues in the installation of automatic controls. New light has been thrown on the properties of starch by scientific research, thus affording opportunities for improvement in warp sizing. A reel-type immersion roll, for some time in common use in Japan, undoubtedly has some advantages as an aid to penetration in the size box.

Most recent achievement of Committee D-13 is shown immediately below—a machine set up for testing the strength of heavy plied yarns and tabled cords other than tire cord in conformance with a new test method. The method was proposed by a special subcommittee headed by R. H. Adams, of Callaway Mills, Jaws, fillister screws, and pitman arm are larger and stronger. Note variable-speed drive

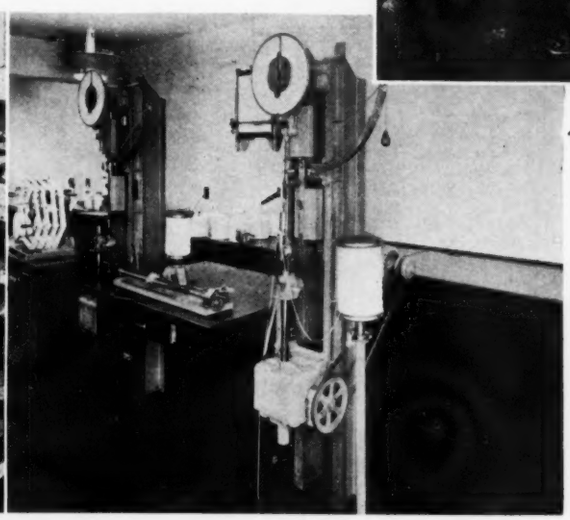


(Courtesy of Bliss Fabyan Co. Photo by Driz Duryea)

A 1936 bedspread in process of manufacture



of long-draft roving



Most recent achievement of Committee D-13 in yarn testing (see above for description)

Weaving

An outstanding development in the weave room is the new Energy Drive designed to increase production where group drives are used. Figures furnished by the Power Transmission Council are of interest, particularly a test run on a set of unit-drive looms and a set of Energy-Drive looms, both groups designed to give the same production. During the test period of eight weeks the unit-drive looms showed a slight superiority in production.

A new pick counter which is really two counters in one has been offered to the weaving mills. The first unit consists of a two-shift resetting pick counter, with provisions for the addition of a third-shift unit should the need arise. The installation of the third-shift unit is a simple matter, requiring only the use of a screwdriver.

Efforts continue to be made to produce heavy duck on automatic looms. Two of the leading manufacturers of weaving equipment have looms in the field on trial.

Cloth Room

Too little attention is usually given to the cloth room. This department is expected to correct and cover up a multitude of faults from the other departments. We hope to see the additional use of labor-saving machinery, better facilities for inspection, and improved equipment for packing in this important division of the mill.

General

Other items of general interest include a new overhead cleaning system, an improved disk-type humidifier, an oil cup that operates by the expansion of air due to the normal increase in temperature of a running bearing, a bobbin-box hoist for bobbin strippers, and a new-type floor mat made of cotton-cord links impregnated with rubber and woven on rust-proof spring wire.

Space does not permit any mention in detail of the splendid work being done in the field of research by the various textile schools, government bureaus, associations, and individual manufacturers. The importance of the work of Committee D-13, the textile committee of the American Society for Testing Materials, is being more widely recognized. This group is doing much to bring the manufacturer and user or consumer of textiles toward a common understanding. The general acceptance of standard methods of testing and of standard tolerances, as advocated by this committee, should prove beneficial to all concerned.

PRACTICAL HELPS

for Cotton Overseers

IN SLASHING cotton warps, the use of immersion rolls of the reel type, instead of solid cylinders, gives the sizing mixture an opportunity to surround the yarn completely and tends to remove the greater part of the pressure on the yarn.

•

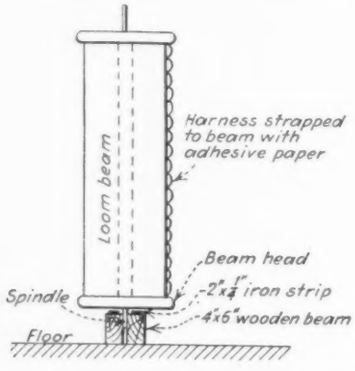
WHEN LINING UP a loom, under no circumstances pack the back of the box backs in order to line them up with the reed. Such packing is likely to work itself loose and undo the job. For a permanent repair, the chipping blocks must be built up by welding and carefully filed down to fit.

•

AS WASTE IS collected and brought to some convenient place, the overseer should inspect it just as it is brought in; then, should any point require attention, everything will be fresh in the collector's mind and easily traced.

•

IN ONE MILL, full beams (harnessed) are stored in a special room fitted with parallel tracks, as shown in the accompanying illustration. The beam head slides on the double tracks with the spindle between, so that the beam and harness can be removed



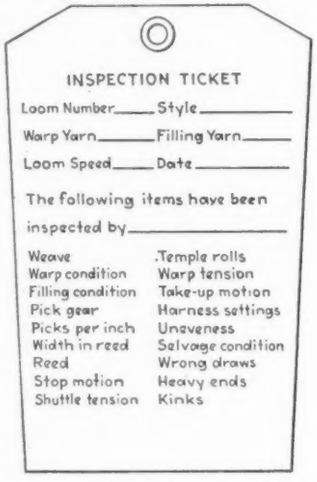
easily without bumping or overturning other beams.

•

THE IDEA HAS always been prevalent that "a good firm lap" is a decided advantage, but research shows that it may be advantageous to forego a certain amount of this firmness in order to prevent unevenness due to compression of the inner layers and expansion of the outer layers. The friction on the rack release is governed by an adjustable weight resting on a lever arm. Moving the weight nearer to the fulcrum point will produce a bulkier lap, but it will be more even. Stop decreasing the weight when the lap becomes too bulky to handle.

•

THE BEST WAY to eliminate errors in the weave is to have one man responsible for every new warp


INSPECTION TICKET

Loom Number____ Style____

Warp Yarn____ Filling Yarn____

Loom Speed____ Date____

The following items have been inspected by____

Weave	Temple rolls
Warp condition	Warp tension
Filling condition	Take-up motion
Pick gear	Harness settings
Picks per inch	Unevenness
Width in reed	Selvage condition
Reed	Wrong draws
Stop motion	Heavy ends
Shuttle tension	Kinks

started up. The first ¼ yd. woven should be taken off and inspected by this man for correct weave, proper filling, picks, width, reed marks, kinks, etc. The inspector should then go to the loom and check the harness settings, shuttles, tension, etc. The inspection tickets are turned over to the overseer at the end of each day.

•

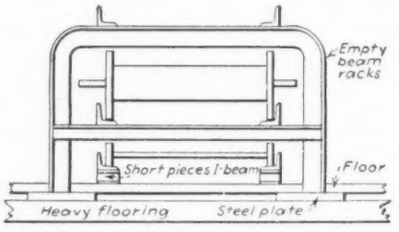
GREEN LIGHTS may be fastened to the ceiling over the loomfixers' benches. When a loom breaks, the weaver turns on the light and marks on a pad the time the loom stopped. The loomfixer comes to his bench, turns off the light, and goes to fix the loom. When he comes back, he marks down the time lost and the cause. With this plan, the weaver does not have to hunt for a fixer.

•

FOR CARDS, the recommended procedure is to take advantage of the precise testing and grinding which is possible with a regular top-flat grinding machine, as contrasted with the apparatus which is part of the card. About once a year the flats should be taken from the card, given a thorough machine grinding, and carefully tested for evenness from end to end and for uniformity of all flats.

•

A TWO-TIER metal rack is useful for storing beams in the slasher



room until ready for use. These racks, constructed as shown in the accompanying illustration, are built so that the beams may be rolled on them to any point in the room back of the slashers. From there, an overhead monorail conveyor moves them to the slasher creel.

•

EACH SECTION HAND in the card room should examine the machinery according to the following schedule: one picker each week; each card after grinding; about two lappers, combers, and drawing frames each week; about four fly frames each week, preferably while being doffed. Such inspections enable the overseer to ascertain in advance what repair parts and supplies will be needed.

•

TWO CROSSES in the warp save time when a tying-in machine is used. Proceed as follows: After the original warp is tied in, leave two crosses instead of one, as shown in Fig. 1. Leave the sticks in all the time when weaving. When the warp is run out, place another stick (No. 2) in the same shed as stick No. 1, as shown in Fig. 2. Loosen the warp as much as necessary so that stick No. 1 can easily be pushed toward the rollers, as shown in Fig. 3.

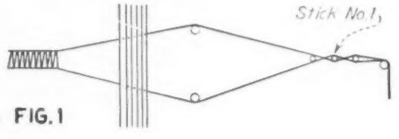


FIG. 1

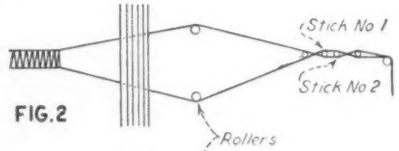


FIG. 2

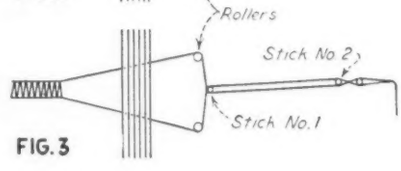


FIG. 3

These items have been culled from the 1936 issues of TEXTILE WORLD.

Close to Record Year

In wool market with fair profits and high activity continuing into 1937

FOR a year in the "off" cycle of the up-one-down-the-next course of the wool manufacturing industry, 1936 made an excellent record. Physical volume in apparel fabrics was only about 6% under 1935, but when it is recalled that 1935, with a gain of 80% over 1934, about equalled the industry's high record, the more recent achievement is the more remarkable.

According to market prices, and indices drawn therefrom, the margins for profit for wool manufacturers in 1936 were not so satisfactory as for several years. This was due largely to the fact that the two upturns in 1936 (one in January-March, the other in October-December) were both lead by the raw material, with finished goods lagging behind. For the manufacturer, profits were therefore difficult, unless he had bought wool in anticipation. The very sharp rise of wool through November, amounting to nearly 20% in that one four-week period, spelled a good profit on wool inventories for those who had them, but meant restricted margins for those who may have lagged in covering.

The old year ended with the sharp upturn just mentioned; fair strength at the highest price levels recorded for 10 years marked the beginning of 1937. A tremendous business was done during the November-January period which, as a nest-egg for 1937, promises to help this year to turn in the necessary volume-of-production figures to keep its destiny as the upper half of the two-year cycle.

The new year begins with machinery producing at a rate seldom witnessed before and words of caution against choking an excellent season by too much third-shift operation are being heard. The industry has its fate more than ever in its own hands, and, as (in common with all industry) it may be called upon soon to meet the challenge of some form of governmental supervision, there is every reason for caution and far-sighted planning.

A factor tending naturally to retard production is the somewhat definite limit now evident in raw material supplies. The wool surplus was wiped out in 1935 and stocks have swung toward the subnormal during 1936. The world's potential military needs are tieing up quantities of wool in world markets, and supplies from outside the United States may not be so freely available except at higher and higher prices.

Into this situation comes a timely arrival in the form of staple rayon which is described by many as a "natural" for mixing in various proportions with wool. This fiber is a definite safety-valve against a runaway wool market, especially if wool values are set by events outside this country at a level too high to permit the desired volume of sales in apparel fabrics on our own markets. Already prominent wool manufacturers are working staple into their fabric offerings and are finding certain advantages in effects and durability. However the labelling problem looms ahead. The resulting fabrics cannot properly be called "wool" since that term is reserved for those containing 95% or better of the animal fiber.

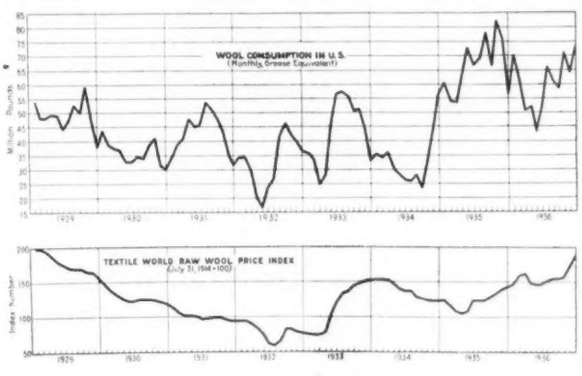
Turning back to the start of 1936 we find wool exhibiting its rising trend against the dead weight of a reluctant fabric market. The gain of 5 to 10c. per yard in January was regretted as likely to force quality degrading by the chain clothiers who wished to maintain their price ranges. However, the industry had a good back-log of profits from 1935 operations and the independence of sellers revived buyers' enthusiasm and February's advanced fabric levels were held through to July. In March the onslaught of New England floods did $3,000,000 damage to the wool goods industry and set back production one to three weeks.

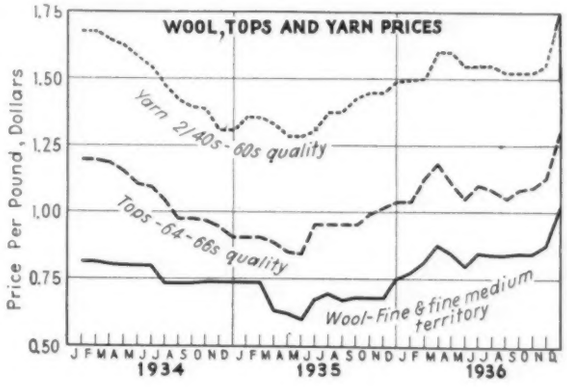
This check on output proved a blessing in disguise as the market's needs shrank with early spring apathy. The low point in production came in May with volume 40% under January.

In early summer, labor made threats to get a 20% wage rise, 35-hour week, no third shift and union recognition. Scattered strikes followed through August but the great majority of workers in the few plants affected were disinterested and the strikes faded out. In November, after the start of the year's most concentrated market activity, the industry volunteered a 10% wage advance which put full-time weekly earnings back to 1929, though then 48 hours was required, against the current 40 for the same money.

In September the pre-opening basis on fabrics, a cut of 5 to 7½%, was carried through into the formal openings, a step criticized by conservative traders who called the sacrifice of profits needless. There were reported to be, however, large carryovers of garments at retail due to failure of the bonus payment to veterans to expand this trade as had been anticipated. Mills priced spring goods below replacement cost and thus started a buying spurt. Early October witnessed small advances, and by the close of the year fabrics were 15 to 20% up over opening, with three or four jumps totalling from 20 to 42½c. per yard. Raw wool rose more quickly even than fabrics, and its strength helped the boom.

Carpets and rugs passed a better-than-normal year with a fairly smooth upswing in volume as 1936 progressed. Price advances were largely concentrated in the last quarter.




WOOL, TOPS AND YARN PRICES
Price Per Pound, Dollars
1.75
1.50
1.25
1.00
0.75
0.50
Yarn 2/40s-60s quality
Tops-64-66s quality
Wool-Fine & fine medium territory
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1934
1935
1936

Large-Package Mules

Reduced fiber breakage in carding, abbreviated worsted drawing, high-speed dressing mark progress

By J. C. Lowe and R. A. C. Scott

Comparison of modern mule package with the old size

THE FIRST PART of this review of the year's progress in wool technology, covering woolen and worsted yarn manufacture, was compiled by Professor John C. Lowe, of Lowell Textile Institute. R. A. C. Scott, well-known fabric technician, prepared the second part, on cloth manufacture.

WHAT has 1936 offered to the woolen and worsted yarn manufacturer that may be called new?

The most important improvement for woolen spinners is the development of the high-speed, large-package mule. One machine builder, on his latest woolen mule, uses a bobbin 13½ in. long running at greatly increased speed. Without change in gage, the new bobbin holds 6¼ oz. of yarn, compared with 2¼ oz. for the old package. One installation of the same type of mule produced a 9½-oz. package, which replaced a 1½-oz. package.

Another machine builder has built a high-speed woolen mule which can be run, fully loaded, at 6,000 r.p.m. In actual tests the spindles have run at 10,000 r.p.m. without vibration. Trials with this mule enable the following comparisons to be given: 2¾-in. gage, 5.4-typp (3⅜-run, 18-cut), 5,650 r.p.m., 11 oz. of yarn on a 14-in. bobbin. This replaced a 2.35-oz. package wound on an 8¾-in. bobbin. In another mill 7¾ oz. of yarn is wound on a 14-in. bobbin. This mule has a 76-in. stretch.

Woolen Ring Frame

Does the new high-speed woolen mule menace the advance of the woolen ring frame? The year 1936 has recorded a steady increase in the number of woolen ring-frame spindles. New models have been designed, and frames are now built which are 4 in. narrower and which use a 12-in. bobbin and 5-in. vertical ring. High spindle speeds are assured—6,300 r.p.m. in actual tests. A package containing 1 to 1½ lb. is obtainable. Such frames have spun yarns ranging from .7-typp (⅞-run, 2⅓-cut) of very poor stock to 10-typp (6¼-run, 33⅓-cut) of high-grade stock. This frame uses Eadie self-lubricating rings.

Dusters, Pickers, Cards

Other interesting developments include improved box dusters and a new steel-cylinder (unburstable) mixing picker. The picker is made 48 in. wide; and the same-diameter cylinder can be run up to 1,200 r.p.m. This is an increase from 900 r.p.m., or a 33⅓% increase.

An improved card for opening hard waste has been developed in Germany. It is designed to open up the hardest ends by a gentle action.

Clothing of Platt wire and hardened-point garnett wire has not made much headway on woolen cards. To date it is being tried only on the workers, strippers, and doffers of the first breaker. In worsted carding, however, these new-type card clothings are proving their worth. Some mills report an actual decrease in noil and a slight increase in staple length in the top, while some report an increase in noil.

Research having indicated that the bulk of the fiber breakage in worsted carding takes place in the forepart of the card, attempts are being made to reduce this breakage. Modifications so far include two or three pairs of feed rolls followed by some form of opening roll or other opening device. In England a roll known as the "Hilton" roll has been tried with success. It consists of a cylinder carrying widely spaced bars suitably pinned. This roll combs at the wool as it is delivered by the feed rolls. The treatment opens out the staples and so reduces the severity of treatment received at the lickerin.

German inventions for reducing fiber breakage utilize coarsely pinned, widely spaced faller bars moving in a circular path but held in a vertical position throughout the revolution. A brush transfers the wool from the faller pins to a lickerin. On the lickerin, in one card, a brush is used, followed by a stripper and worker.

Intersecting Gill Boxes

More mills have extended their use of intersecting gill boxes. On account of the width between front-roll bearings, it is claimed that a 1-in.-diameter front roll cannot be used. Therefore, boxes are equipped with 1½-in.-diameter front rolls.

Suppose a mill has five gill boxes using 2-in.-diameter front rolls and ⅜-in.-pitch ordinary fallers. This box can be changed at great expense to intersecting type $\frac{5}{16}$-in. pitch with 1½-in.-diameter rolls; or it can have a small 1-in. front roll installed with no change in fallers. The uncontrolled distance of the intersecting box will be approximately equal to that of the ordinary gill box. New intersecting gill boxes should have the smallest-diameter roll possible, and the builders will take care of the design so that heavy-enough ends can be handled at high speeds. The French-combing system benefits from these machines. Why should not the English system?

Drawing Operations Reduced

Reduction in drawing costs has steadily occurred in most progressive worsted mills. Some mills have made remarkable changes without modifying the sets of drawing. Other mills are using intersecting gill boxes to assist in the reduction of operations. In the French system intersecting gill boxes are being used on four or five operations, followed by two or three porcupine frames, thereby reducing operations from ten to eight or nine to seven. It is prophesied that the porcupine-roll frame may soon disappear from French drawing altogether and that high-draft, gill-box, spinning frames may be the final outcome.

Why not use more intersecting gill boxes in the English system? One such box can replace the ordinary can gill box and two-spindle gill box, while another could function in place of the heavy drawing box and the weigh box.

In this way, seven operations will be the maximum, while the minimum may be limited to five where the Bradford type of yarn is necessary.

A new cone rover is available which can be run at 2,200 r.p.m., using an 8x4½-in. bobbin. Improved dandy rovers, with flyer speeds of 2,400 r.p.m., are successfully competing with ring rovers.

Worsted Spinning

Large-package ring frames are still replacing cap frames. It is claimed that, on the latest models, all qualities can be handled, spinning counts up to 1/48 in.

Cap spinning in menaced, but it is not doomed. It is still the easiest method of spinning, and it is the best system to use for limit spins. Increased production does not always mean a final saving. A cent saved in spinning can be easily lost in spooling, twisting, weaving, burling, and mending. Larger caps and improved spindles are enabling mills to produce a 2-oz. package on suitable counts.

Ring twisters are keeping pace with the times. Large-package frames are able to twist yarn from two large ring-spun bobbins on one twister bobbin with resultant advantages in later processes. Spindles have been modified so that tape and tension drives can be applied to all stop-motion frames.

Worsted Roll Covers

The search for the perfect top-front-roll covering for drawing and spinning frames continues. The use of cork-covered rolls, without parchment covers, is increasing in the French system. Will parchment ultimately disappear from French drawing and French spinning rooms?

In the English system a few mills are gradually replacing cork-covered rolls with leather-covered rolls. Other mills have found it advantageous to use leather-covered spinning rolls for fine counts or plaited yarns. In the spinning there is a demand for some type of dressing which, when applied to cork covers, will cause the wool to follow the top roll when an end is down.

A new roll covering, "Everlastic," which has as its basic ingredient the synthetic rubber compound Duprene, is available. It is oil-proof, non-oxidizing, and unaffected by temperature changes. In worsted mills where this product has been tried roll pressures have been reduced 25 to 80%.

"Koroseal" is another new roll-covering material which may have possibilities in the worsted industry. It is also a synthetic-rubber compound. Tests show that it possesses great tensile strength and that its resistance to wear and grooving is high. It is very flexible and resilient and offers great resistance to abrasion. The fact that it is highly water-repellent and affords little or no lick-up of fibers may prevent its use to any appreciable extent in worsted spinning.

In the field of research Prof. J. Wilson, of the University of California, continues steadily his efforts to improve the top-making qualities of wools. In May he announced results of tests to determine the relative top-making qualities of fine-wool fleeces having pearl tips and those having broad tips. Pearl tips, he found, give 7% less shrinkage, slightly less noil, ½-in. longer top, and a better-handling top.

The use of rayon staple and related fibers by woolen and worsted mills is discussed elsewhere in this issue. Manufacturers of worsteds for outdoor wear will do well to proceed with caution in adopting these fibers, because when fabrics containing them are wet, they become soggy and clammy and they stretch to such an extent that garments lose their shape. Tests indicate that fabrics made from the blended yarns do not wear so well.

The "line" method of production has been applied to wool sorting. Fleeces, after being strung, are placed on an endless belt. Sorters are suitably arranged on each side, enough to handle the fleeces as they slowly pass along the belt.

(Professor Lowe's contribution is concluded here. Mr. Scott's follows.)

Warping and Weaving

On the subject of looms, it is worth while to mention the development whereby a pick-and-pick non-automatic loom can be converted into an automatic loom, or vice versa, in 30 min. or less. Relatively few parts are required to effect these complete changes; and in addition, all parts being suitably marked, it is not necessary to use a gage in lining up. The operations to be followed in converting the one type of loom to the other are simple and require little or no skill in their accomplishment.

Who knows but that some day an electric-eye color detector will be devised to permit contrasting colors to be run pick-and-pick on automatic looms?

With the speeding-up of the looms, it is natural that preceding operations should demand the attention of man's ingenuity, if for no other reason than to balance inter-departmental production. Hence we find the new "streamlined" dresser reel. A pinless attachment is used in connection with this reel which, besides effecting a saving of time when starting a new warp, prevents section marks in the woven cloth. The reel itself is built to hold long warps and sections up to 9 ft. in height. Electric automatic brakes are included in the equipment; and, when the reel is running at high speed, it can be stopped in 12 to 18 in. of warp. The speed can be controlled to admit of 25 to 500 yd. per minute.

An electrical device has been developed to locate carpet needles which have become broken and imbedded in the finished product. The carpet passes through a narrow slit; and at the point where a broken needle passes, a distortion in a magnetic field is caused, producing the necessary signal. Lengthwise and transverse passes of the carpet detect the needle where the two lines intersect.

Progress has been made in the direction of educating the retailers and purchasers of woolen and worsted fabrics on the "all-wool" and "part-wool" labeling problem. It has been definitely agreed that fabrics under the definition of "100% wool" and "all wool" must be entirely of wool with 2% tolerance for foreign matter. The term "wool" may be applied to fabrics containing 95% or over of wool by weight with 2% tolerance. The use of the word "wool" is prohibited, however, on fabrics containing less than 95% of wool, unless the percentage of wool content by weight is stated as legibly as the word "wool." Fabrics shall be marked "weighted" when more than 5% of the finished weight is due to a non-fibrous substance.

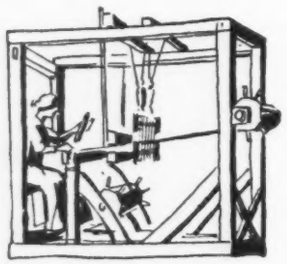
It is rather surprising to note that no provision has been made for the distinction between woolen fabrics made with 100% reworked wool and those made with 100% virgin wool.

Leading advocate of the scientific measurement of wool fineness—Dr. Werner von Bergen in his dark room at the Garfield plant laboratory of Forstmann Woolen Co. Shown are the projection microscope for wedge-method measurements and a mercury-vapor lamp for facilitating identification of oils and fibers and for detecting mildew damage

PRACTICAL HELPS

for Wool Overseers

SOMETIMES THE ROLLING together of warp threads in basket weaves can be prevented by breaking the shed. Also, when yarns of two different fibers are used, bunches can



be prevented. In one particular case where cotton and wool yarn were being woven, bunches on the cotton were eliminated by breaking the shed as follows: Raise the stirrup eyes which carry the harness wires to a point quite near to the top of the jacks; put the under stirrups near to the outside end of the jacks; raise the harness a little also. This gives a small shed for the wool and a larger shed for the cotton.

•

AS AN AID in preventing neps when carding for woolen yarn, a dickey roll should be placed on each doffer. The roll should be clothed with old fancy clothing, should be set lightly into the doffer, and should be driven from the fancy so that it has a higher surface speed than the doffer. A dickey roll keeps the doffer teeth smooth and sharp, and also keeps the points clear.

•

IN CARDING WOOL, the ideal plant should be worked under controlled atmospheric conditions, in which case any desired percentage of relative humidity is available. Even if controlled humidity is out of the question, the wool should always be in such a condition that it is losing moisture to its surroundings rather than picking it up. In such a state, it is easier to stretch the fiber without breaking it.

•

THERE ARE SEVERAL methods of making the brake stop the loom quickly enough: The brake lever can be adjusted to increase the leverage; the cam which releases the shipper handle can sometimes be brought closer, so that the release is more prompt; and the amount of spring can be increased by adjusting the collar on the brake rod. Sometimes it is better to place a new spring on the brake rod, as these springs are of the pushing type and will not retain their strength forever.

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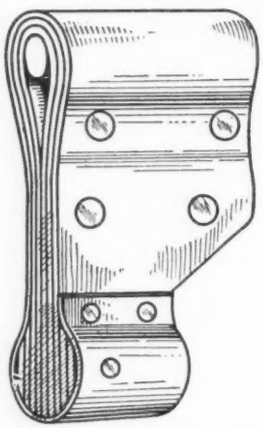
TO PREVENT the inside bearing of the picker spindle from wearing out, the picker should be placed on the loom with care. Make certain that the picker spindle is centered with its inside bearing before the spindle is placed in that bearing. Many times it will be found that, when



the spindle is made fast by the setscrew of the outside bearing, the inside end of the picker spindle will be 1 in. away from center of the bearing. Always prove the line of the spindle by fastening it before placing the inside end into its bearing, and make it central to that bearing by either packing or filing the outside bearing.

•

THE ACTION and setting of the dabbing motion and dabbing brush on a Noble comb are important, and the following hints may be of assistance: Set brush to dab the stock in the pins right at the tangent and so that, for depth, the stock will be down far enough to leave half of the pin clear; see that a good heel is kept on the brush; do not dab the stock too deep; setting the brush so that it dabs in front of or behind the tangent will result in neppy slivers; when a brush picks up too much, take it off; set the brush to dab across the entire set-over of the small circles; if possible, inspect the dabbing brushes every hour.

•

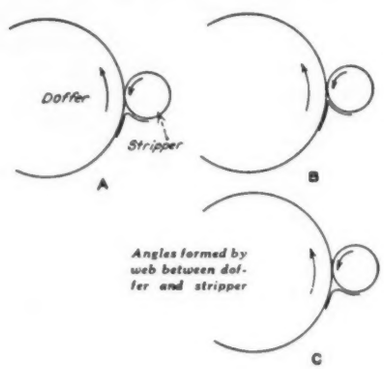
PRACTICALLY ALL loomfixers bore the screw hole *A*, shown in the diagram of the picker stick, at right angles to the center line of the stick. This means that the screw will come out if the hole is a little too large, or that the stick will be split if the hole is too small and the screw is forced in. If, however, the hole is bored diagonally, as shown, the screw will never come out and will never split the stick.

•

COLORED SLIVERS for twist effects in worsted yarns should be blended carefully so that all the colors and fibers are mixed evenly. Regularity depends on skill in arranging the ends of specific colors in the gill box. Small amounts of toning colors should be made into temporary mixtures and run in with the blend. When, say, 3 or 5% of red is to be mixed with a brown shade, the small portion of toning color should be mixed with at least 10% of the brown at a prior gilling operation.

•

THE STRIPPER on a card must be set into the doffer from $\frac{1}{32}$ to $\frac{3}{32}$ in. Any variation needed in the tension of the web of the material should be obtained by varying the speed of the stripper and not its setting. In passing from doffer to stripper, the web must rise well up into the angle between the two, but



not so high that it will be nipped. In the accompanying diagram, *A* shows the correct angle; *B*, too high a position except for fine and short material; and *C*, too low an angle. To remedy *B*, speed up the stripper slightly; and for *C*, slow down as required.

These items have been culled from the 1936 issues of TEXTILE WORLD.

Rayon & Silk Outlook Strong

Seller's market prevails for synthetics—Quality trend aids silk

RAYON:

A SELLER'S market—plus! That epitomizes the rayon yarn industry today. Whether we look back to 1936 or forward into 1937, the picture is the same: Record-breaking sales running well beyond the industry's capacity. In the consuming industries, the 1936 showing was somewhat less satisfactory. Woven and knitted goods alike had a spotty year. In woven fabrics, the major outlet, the situation was mixed. Certain weavers, especially in the so-called "cotton branch" fared well. Generally, however, the trend was to run high on volume and low on profits. During the closing months, fabric prices advanced, and sales showed a further rise. At present, prospects point to improvement in profit position for weavers during 1937.

Statistically, rayon yarn has continued its progress. In 1936 domestic production exclusive of staple fiber totaled 277,626,000 lb., or about 8% over 1935. Even more significant was the consumption figure, which ran up to 297,594,000 lb.; this represented a gain within the year of 15% which ate up all surplus, leaving the industry with 3 days' supply at the year-end. The shortage was due to under-capacity, strikes, floods, etc. Yarn prices moved conservatively in 1936. A mid-year rise of 3c., bringing 150/140 to 60c. was the only recorded advance. Toward the end of the year discounts were discontinued, and this was tantamount to a second price rise for most customers.

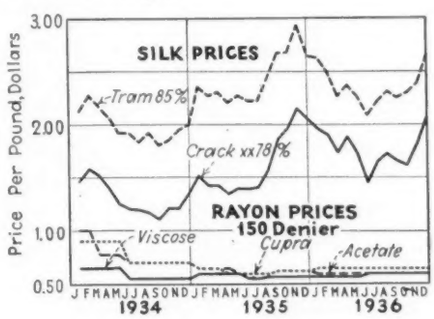
All signs indicate strong demand for yarn, even to the point of acute shortage, during 1937. So that any estimate of outlook must center on the expectancy of increase in yarn production capacity. What is that expectancy? Current plans provide for an expansion which will raise the industry's capacity to over 400,000,000 lb. yearly by the first quarter of 1938. However, only a moderate increase will be effected during the current year and most of that increase will come in the concluding months. Therefore, present capacity will prevail through the major part of 1937, which, assuming even a slight gain in demand would predicate continuance of the current seller's market.

To management, this very boon brings its own responsibilities. Relieved of many sales worries, the yarn industry might well take advantage of its favorable status in 1937 to study broader problems and to consolidate its position as a textile division.

Rayon's merchandising activities of major significance in 1936, were: (a) Increased acceptance in lingerie field; (b) continued gains in pigment taffetas; and (c) improvement in discharge printing on acetates, which stimulated acetate yarn consumption in popular-price dress fabrics.

One possible danger facing rayon is that the current yarn shortage may cause the industry to slacken up on its market development activity. Considering the big rise in rayon production due for 1938, any such relaxation of market development would be imprudent. If present expansion schedules are followed, rayon capacity in 1938 will be more than 25% above 1936. Logic therefore suggests that the yarn industry should begin in 1937 to build new markets to absorb the expected output increase of 1938.

On the whole, rayon's progress in 1936 continued as inspiring as ever, and, with the stimulus of the economic pick-up which now looms so definitely on the horizon, 1937 should carry the synthetic textiles to new records of volume and profit.

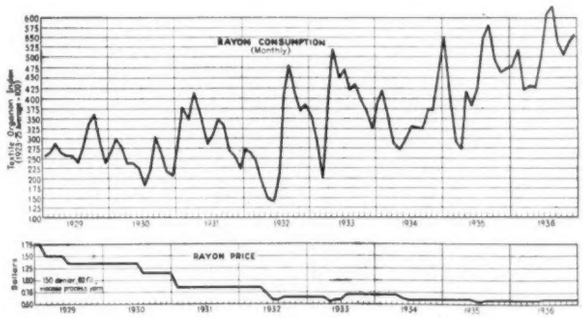


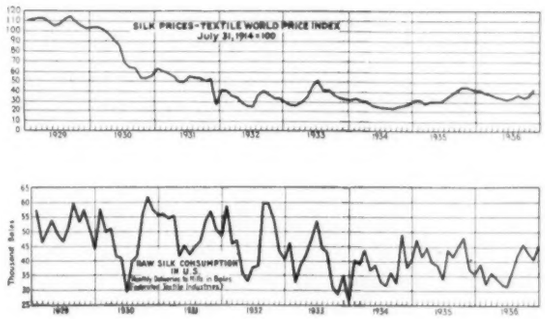
SILK:

BOTH in its 1936 accomplishments and in its 1937 outlook, the silk picture is one of progress and encouragement. While the opening year finds various important problems unsolved, it is undeniable that 1936 laid the foundation for further advance toward solution of these issues. In the second half of 1936 both prices and deliveries of raw silk showed a marked rise: Crack double extra 13/15 white 78% rose from \$1.45½ in June to \$2.02 in December, and the delivery figures for each month from August onward, excepting only October, were larger than the same months in 1935; furthermore, the degree of this gain rose progressively each month.

The improvement had four chief causes: (a) general economic pickup and freer consumer spending; (b) Japan's 10% curtailment of silk production; (c) quality trend among textile manufacturers and consumers; and (d) intensification of promotional effort by International Silk Guild. However, silk's new strength also draws from other sources. The year was marked by a "getting under way" spirit, and it signalized various important and progressive trends. For example, the Raw Silk Importers, Inc., completed its first twelve months and entered 1937 a solidly established body, with a membership of 41 against 18 a year ago. Likewise, the Silk Guild continued its vigorous promotional effort, and projected a yet more extensive fiber identification drive for 1937. While individual trade association work has been commendable, the most important accomplishment of 1936 has been the trend toward coordination of trade body effort.

Indications are that during 1937 silk will hold its gains in price and deliveries, and might even advance. However, careful study must be given to two major needs as follows: an associational identity for the term "silk," and, yet more important, a breakdown of consumption data by branches.





Large packages and flat quills among outstanding developments in rayon and silk

Throwing and Weaving

By H. I. Jackson and John Picone

IN THIS article Henry I. Jackson reviews the technical progress of the year in throwing rayon and silk. John Picone discusses the advances in warp preparation and weaving.

THE last year has seen both an ever-widening gap between silk and rayon throwing and also a good share of developments, innovations, and improvements in each field. Many machines and methods have been designed and introduced particularly for each type of throwing. In silk throwing, the trend has been toward higher and higher spindle speeds, largely brought about by the increased load on twisting due to the demand for high-twist hosiery. In rayon, the trend has been toward larger and larger packages, which limit the possible speeds. Of course there has been some overlapping; for example, both fields have been recognizing package-to-package operations as essential to efficient operation.

Single-end silk is now being twisted up to 17,500 r.p.m., and doubler-twister speeds have achieved the 10,000 mark. In rayon, packages up to 7 in. in length and 3 in. across the head are being used. The beginnings of these trends antedate the year 1936; but much of the development has been very recent.

One-Operation Throwing

As to special machines, there was offered last year a new "one-operation" throwing machine that takes the yarn on skeins and delivers it either on cones for knitting or on filling bobbins for weaving. A number are reported to be in use on silk, but none so far on rayon. Some special machines have been built recently for the plying of rayon-crepe-and-acetate combination yarns. These machines, which are of the cotton-twister type featuring two different feed rolls, are replacing the customary doubler-twister for rayon combination work. Word has leaked out of a second "two-for-one" twisting machine, even before use of the first has progressed to any great extent. These machines insert two turns in the yarn for each revolution of the spindle.

To date no less than three different rayon soaking machines have appeared on the market. Their chief value, aside from lowering costs in some cases, seems to be in giving more uniform results if certain practices are adhered to, and in setting a higher speed of operation for the soaking department.

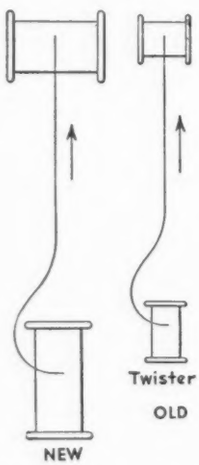


Fig. 1—Large packages have double the capacity of those which formerly were standard.

Efforts of the last several years have now culminated in more satisfactory soaking compounds for silk and for rayon. In the rayon field, soaking agents have been announced for uniformly developing fine, medium, or heavy pebble at will, while keeping the twist factor constant. Soaking materials, incorporating a plasticizer, have been offered for silk to aid in direct three-carrier knitting.

Innovations in the construction and layout of throwing plants are exemplified by the windowless and glass-brick-windowed plants which are discussed elsewhere in this issue. Throwsters are realizing more than ever before the value of time studies and job analyses.

Among the mechanical developments not heretofore mentioned which came to the forefront last year are the following; skirted swinggates for twister spindles to minimize the dangers of oil pumping; larger spinning spindles to accommodate larger packages; grooved cams and screw-type traverse motions for more positive and smoother operation; a stop motion for full bobbins in redrawing, but applicable also to winding; a supply-package stop motion for revolving spool supplies; a wider range of quick-change porcelains which do not require gluing; more completely oil-less operation by increased use of oil retaining bearings; Bakelite resinoid material for bobbin heads; a machine for cleaning throwing bobbins; a roller type thread guide, either with or without a cleaning unit; cork inserts in either wooden- or steel-headed take-up spindles; pre-adjusted spindle swinggate springs; a "flip-up" centering eye above the spindle on doubler-twisters; and "spindleless" winders and redrawers.

Among the non-mechanical developments were: larger skeins in rayon; minimum twist requirements in crepe hosiery silk; slower winding speeds in rayon; increased use of cuprammonium rayon for crepe; higher humidification when twisting cuprammonium yarns; continued trend toward elimination of the redrawing operation; and a general trend toward higher operator production, even at a sacrifice of machine efficiency.

In the opinion of the writer, a backward step occurred last year in rayon throwing through no fault of the throwsters. This was in the cessation of a large rayon producer to furnish rayon to throwsters with both "S" and "Z" twist. The result has been a preference for other brands, which might culminate in this producer's return to its former practice.

Eliminating Redrawing

There is definitely an increased trend toward the further elimination of the redrawing operation in crepe yarn. This does not necessarily mean that the headless package is now invading crepe, as it is starting to invade low-twist yarn. It may do so, however, in the coming year, particularly if American throwsters follow the example of the British in this respect.

It is generally conceded that high-twist hosiery yarns will continue to be thrown. This assumption is based both on the present demand and on the in-

herent advantages of the finished product made from these yarns.

Sooner or later a compromise in throwing must be made between speed and large packages, and it is to be expected that the coming year will add much to the solution of this problem. There is bound to be even more development in the future than in the past toward package-to-package operations and toward more and more efficient division of work layouts. It is to be hoped that balloonless spinning can soon be applied to throwing and that better solutions to the tension problems generally can be found. There is certain to be increased adoption of "spindleless" winding and redrawing.

As to future machinery possibilities, it is logical that the few throwing machines of "revolutionary" design introduced will be retarded by their own need of further development, by the close competition from the most modern machines of conventional design, and by financial considerations. They need not unduly alarm owners and operators of existing machines, but do show the necessity of always keeping one's mind open and one's plant as modernized as possible.

(Mr. Jackson's contribution is concluded at this point. Mr. Picone's discussion follows:)

Weaving Equipment

New developments in weaving equipment have come rapidly in recent years—so rapidly, in fact, that I had occasion, in a paper recently presented before a group of textile engineers, to point out that the loom is in danger of assuming the appearance of a Christmas tree laden down with ornaments. In order to avoid the possibility that weaving may become too complicated to permit efficient operation, I recommend that mills adopt new attachments with some degree of caution, first trying them out on a few looms to make certain that it will be desirable to apply them to the entire weave shed. I do not intend to imply for a minute, however, that mills should not keep on their toes and thoroughly investigate each new development as it comes along.

Among the outstanding mechanical developments of 1936 is the flat quill, which not only makes possible the assigning of more looms per weaver, but also is capable of reducing the number of seconds which a mill turns out. I welcome this last advantage in particular, because in recent years the market has been too often demoralized by the offering of an abundance of seconds at low prices; but unless the flat quill is applied to automatic weaving, I cannot see that it is any threat to the latest types of automatic looms now operating so extensively on round quills. The new cam harness motion, rear-tension shuttle eye, and other improvements have so advanced the automatic weaving of rayon and silk that it is difficult to see how non-automatic and automatic looms can compete on the same fabric. Most mills adopting the flat quill today are doing so to cut down the differential between non-automatic and automatic weaving; but if their fabrics are adaptable to automatic weaving, they are making a serious mistake by not adopting the automatic loom. (The flat quill was discussed in a feature article in the November issue of TEXTILE WORLD.)

Other developments in weaving equipment include two new paperless beams, one with extra large flanges and one surprisingly light in weight and easily adjusted. A new temple roller having a gripping surface of cotton cord spirally braided on a rubber cushion is particularly adapted to the handling of fine fabrics.

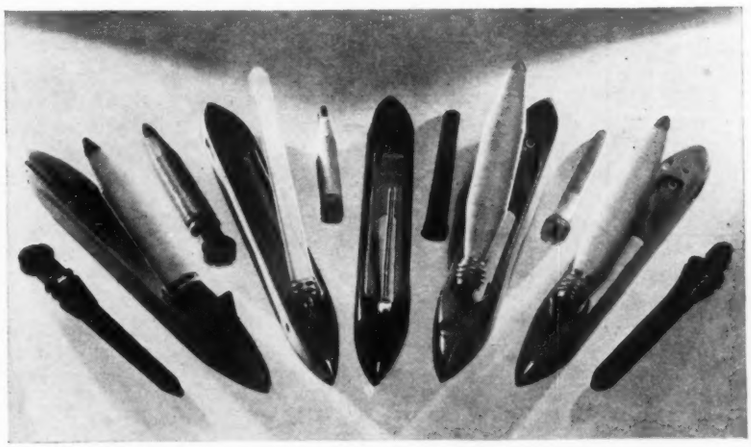


Fig. 2—Various types of flat quills and the shuttles designed to hold them. Round quill is shown just left of center to permit comparison.

Handling Warps

For operations previous to weaving, improvements include an automatic silk leasing device which prevents crossed ends and ringers in high-speed weaving. Several new warp-sizing machines have been brought out, at least two of which have seven drying cylinders to permit higher speeds. A third features three large drying cylinders which permit a range of slashing speeds from 80 to 100 yd. per minute. A new tension compensator developed by a rayon producer for quillers aids in the elimination of shiners from rayon taffetas—defects which have caused many mills to abandon this popular number; and this compensator proves to be a remarkably efficient device when mills follow directions as to its setting.

Fabrics of the Year

Fully as interesting as recent trends in equipment are the trends in the fabrics which that equipment is expected to handle.

Early in 1936 a number of mills began to experiment with realistic figures, particularly in the taffeta line, produced both in silk and rayon. In no time, taffeta became definitely a staple article and the mills were sold out far into the summer.

About this same period came a demand for antique satins, heavy satins, and figured satins. Many mills were caught napping when this occurred, and the serious shortage of loom cards compelled numerous mills to pay exorbitant prices for those cards. Particularly notable were the great inroads made by rayon in the case of satins, and many mills on satin found the synthetic yarn a lifesaver as a means for profitable operation. Some satins were made in all rayon and others in silk and rayon combinations.

Along about the summer months, looms operating on silk underwear material came to a stop, and mills specializing in this fabric were compelled to shut down. Many liquidated; and in the case of some of the small shops in Paterson, the proprietors walked out, leaving their looms to the mercy of the landlord. Such looms could then be purchased at the buyer's own price. The underlying cause of this catastrophe was again the inroads made by rayon into a field which had previously been predominantly silk. Rayon mills producing this material were practically sold out.

More and more mills producing crepes are switching from silk to acetate and rayon. Even in very sheer georgettes, which were returning rapidly to popularity toward the close of 1936, many rayon stripes are seen, either satins or figures.

The matelassé vogue refuses to die, although the many eccentricities of the fabric in production have become a headache to the mill man. Matelassé has been for some time primarily a rayon fabric.

Finally should be noted the continued increase in popularity of pigmented rayon.

PRACTICAL HELPS

for Rayon-Silk Overseers

RAYON YARN is subjected to high tensions during copping and winding. Consequently a relative humidity of 45 to 50% gives satisfactory results, as the danger of too easily elongating or over-stretching the yarn is minimized. A tension of 45 grams or lower is considered safe for 150-denier at a relative humidity of 45 to 50%.

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A SYSTEM for checking up on the performance of looms, weavers, and

LOOMFIXER'S CHART

Name John Doe Section A Date 2/6/36

Loom No.	Cut No.	Description	Time Called	Time Fin.	Remarks
14	5	Banging off	8:40	8:55	Held up thread
26	3	Rough cloth	8:57	9:08	Weaver tweaked
19	10	Barré cloth	9:05	9:10	Shuttle wrong Rope unslipped
22	7	Pick Pick broken	10:20	10:35	New Pick
40	1	Shuttle flying out	10:25	11:05	New bumper and picker
37	12	Filling breaks	1:05	1:20	New Pirnies

Foreman's signature James Johnson

loomfixers in silk weaving will place responsibility and increase production. The heart of the system is the loomfixer's chart, illustrated herewith. A new chart should be given the fixer each day and the old one returned. The overseer, however, should examine the chart at various times during the day. When a cut reaches the examining table, the charts governing its production are looked over and the weaver and loomfixer graded accordingly.

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THE FIXER SHOULD go over the dobby before he installs a new warp for a dobby pattern. Hooks, needles, jacks, and index fingers should be removed and washed thoroughly in gasoline or some other solvent. It is better to take a couple of hours doing this than to have trouble later. All worn-out hooks, needles, and index fingers should be replaced; and the parts installed in the proper order.

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OLD TINTS USED in throwing plants sometimes lose their fugitiveness or other qualities because they have been exposed to air. For this reason, it is best to use tints from small cans refilled from supply cans, which are kept tightly closed in a cool, dry place.

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WHERE ROPE LET-OFFS are used in weaving rayon and trouble is had with waviness, the following pointers should help eliminate the condition: Use only Italian hemp rope; keep the beam heads as even and free from grit as possible; do not use graphite or stove polish, as this will cake on the ropes and cause an uneven let-off; wash the ropes in gasoline when the warp is out and replace uneven or worn ones; see that the ropes are not crossed and watch the weights; dress ropes at each cut mark with a powder made of crushed soapstone and a waterproof material or repellent.

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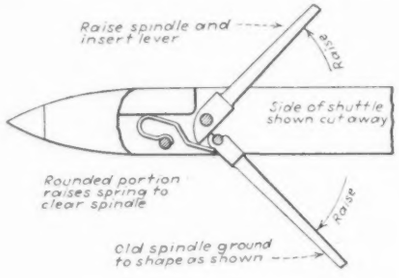
THE SKETCH SHOWS a device for removing spindles from shuttles. All that is needed is an old spindle, an emery wheel, and a file. It is a case of file and try, but there are no complicated nuts, bolts, and cranks


Raise spindle and insert lever
Raise
Side of shuttle shown cut away
Rounded portion raises spring to clear spindle
Raise
Old spindle ground to shape as shown

to assemble. The spring will hold the lever in place while the spindle is being removed and replaced.

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A FEW OF THE THINGS which will cause filling cutting at the box side of the loom are as follows: improper curve on the binder; boxes not timed right and unlevel; worn-out rawhide pickers; picking too hard, too early, or too late; shuttle running crooked.

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WHEN INSTALLING BELTS on silk-rayon doubler-twisters, cut the belts at least 6 in. shorter than the length. A 6-in. piece of old belt is added to make the necessary length. After running for two or three days, the section of old belt is removed because of stretching of the new belt. After a week or two of further running, the belt will be stretched enough so that a 6-in. lap can be made and cemented. This method saves 12 in. of new belting.

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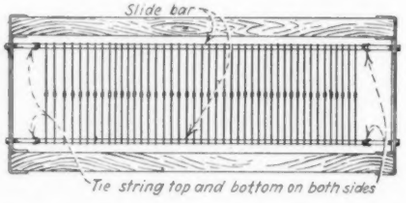
IN WEAVING HEAVY SATIN constructions on five shafts with two for edges, troubles are frequently



encountered, particularly with the edges, due to the fact that the warp ends have a tendency to pull over. Try tying a small string around each slide bar to hold the warp heddles in place, as shown in the accompanying illustration.

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TO PREVENT CORKSCREWS in satins caused by uneven tension of the ends in the warp, some manufacturers are equipping their warping frames with an attachment on the beamer similar to a cam on the winding frames. This permits the warp to travel sideways for a distance of 0.5 in. either way while beaming, so that the layers of yarn cross one another at an angle. This prevents individual ends from imbedding themselves and avoids loose edges.

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ELECTRIC FEELERS sometimes break off along the line marked in Fig. 1, allowing the coil spring and contact point to fly out. To repair the broken feeler, cut it off back of the chipped part; reverse the contact pins and one of the coil springs cut in half, as the two halves are sufficient for one repaired feeler; remove the bushings from the back, screw them into the front end about ⅛ in., and cut off; replace the remaining 6/16 in. of each bushing in its original position. Repair is shown in Fig. 2.

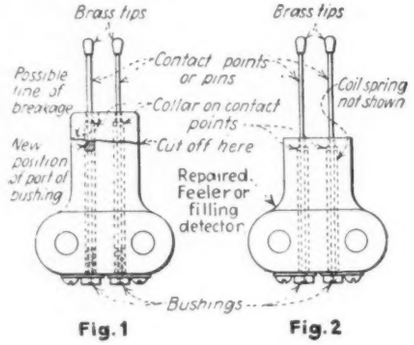


Fig. 1 Fig. 2

These items have been culled from the 1936 issues of TEXTILE WORLD.

Staple's Sensational Year . . .

300% consumption gain carries new fiber into many markets

ANALYSIS of rayon staple's spectacular rise in 1936, when consumption showed a gain of 300% leads to one major conclusion, namely: Staple fiber no longer can be referred to as "promising to become"—*it is*—an important addition to the textile fiber family. A glance at the figures substantiates this: In 1936 staple fiber consumption passed the 25,400,000 lb. mark.

It is scarcely surprising in the light of such a rise that examination should show this fiber to be actively encroaching on both the wool and the cotton textile markets. The percentage of displacement in either field is, of course, highly controversial, and, lacking satisfactory basis of statistics, this promises to remain a matter of opinion for some time. However, two points should be kept in mind: First, that during 1936 staple fiber was used about equally in the cotton and wool textile divisions; and, second, that spun rayons woven on cotton looms were in competition with both wool and cotton goods.

Viewed at close-up, staple's progress during 1936 has three vital phases: First, acetate staple entered the field on a substantial commercial basis—its 1936 production aggregated 3,500,000 to 4,000,000 lb., out of a total output of 12,400,000 lb.* for both types of staple; second, there was a marked increase in the output of woven dress goods of 100% spun viscose staple; and, third, competition between the domestic staple and the rapidly rising quantity of imported—particularly Japanese—staple was accentuated.

With two types of staple now available (it is conceivable also that 1937 may see cuprammonium staple on a commercial basis, though at present operations there are mainly experimental) a situation is in the making not unlike that which originally developed in filament rayon. Two phases warrant consideration: First, the general prospect for market expansion of staple fiber as a whole; and, second, the viscose-acetate staple relationship.

STAPLE FIBER PRICES (1928-36)
for standard 1½ in. 1½ denier number
(Rayon Organon)

January, 1928	$0.60	February, 1934	.34
October, 1931	.50	June, 1936	.28
August, 1932	,40		

With U. S. consumption leaping from 6,000,000 lb. in 1935 to 25,400,000 lb. in 1936* it is needless to dwell at length on the broader aspects of staple fiber's significance. Specifically, a major accomplishment of 1936 was the progress made toward a clearer understanding by staple-consuming industries of the fiber's characteristics and uses. Yarn producers conducted an active educational campaign along this line during the year, and as a result weavers and knitters now are beginning to apply staple fiber more directly to the types of fabric to which it is best adapted.

Viscose-Acetate Relationship: Price differential eliminates any issue of competition between these two types of staple fiber. Viscose sells at 28c. per lb. as against 54c. to 56c. for acetate staple. The two are moving forward in their respective markets; however, while price differential obviously separates these markets in most cases, some mills have combined the two types of staple in developing interesting fabrics. These fabrics are distinguished by a soft effect, agreeable both to hand and eye.

The dominant feature of staple fiber development during 1936 was an aggresive pushing forward into new markets. Various woven fabrics made of 100% viscose staple are now so well established that they have become standard. While viscose staple at present is used mainly for all-spun-rayon fabrics, millions of pounds of the yarn also go into wool mixtures and substantial progress is being made in the upholstery field. Viscose staple outlook is for continued expansion, both in the all-spun-rayon fabrics and mixtures. At present, viscose staple is used, to varying degree, in virtually all apparel and decorative branches in which medium-weight fabrics have a market.

Acetate staple has made notable progress, considering that 1936 was its first year with any appreciable output. It is extensively used in fabrics of 100% acetate staple, and to a minor degree, in mixtures; important development work is still under way, and indications are 1937 will bring a wider range of the 100% acetate staple fabrics.

A major point in the application of staple to mixtures has been that this fiber's use helps to price up cotton fabrics and to price down wool fabrics. Market inquiry indicates that today acetate staple sells in about equal quantities to the wool and to the cotton branches; the same is true of the sale of viscose staple.

The 1937 trend points to sounder and less hectic expansion for viscose staple, and to a gradual emergence from the groping stage by acetate staple. Further remarkable gains by staple fiber seem to be definitely in the cards, but the outlook is not without its problems. Three important issues are: (1) need for more careful study of the fiber's uses; (2) the fantastic rise in staple imports from Japan—approximately 5,000,000 lb. in 1936 against 809,000 lb. in 1935; and (3) the need for a clear-cut merchandising policy with particular regard to the nomenclature problem. Upon the solution to these problems will depend in large degree the prospects of rayon staple reaching new high records during 1937.

*SUPPLY OF RAYON STAPLE FIBER (in thousands of pounds)**

	1928	1929	1930	1931	1932	1933	1934	1935	1936
Domestic Production — Staple Fiber [a]	165	500	350	860	1,100	2,100	2,200	5,200	12,400
Production as % of Available	*45*	*26*	*40*	*55*	*33*	*39*	*91*	*78*	*49*
Staple Fiber Imports	54	1,052	527	663	2,185	3,302	215	1,457	est. 13,000
Spun Yarn Imports [b]	146	384	91	52	12	18	7	4	14
Total Available for Consumption [c]	365	1,936	868	1,595	3,297	5,420	2,422	6,661	25,400

a. Acetate yarn and staple fiber data partially estimated. b. Before June, 1930, "Yarns made from waste"; after June, 1930, "Spun yarn, singles and plied." c. Essentially "consumption," no account being taken either of normal stock increases or other stock changes from year to year. Staple fiber exports are negligible and not reported separately. * From *Rayon Organon*.

Rayon Staple Begins

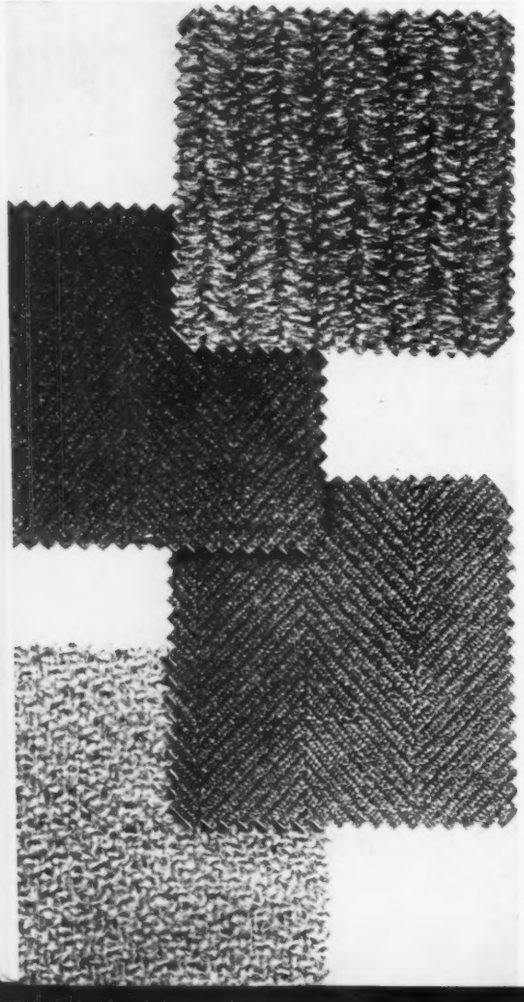
To assume important place in textiles, as wool-like fibers are developed and processing improved

By Irving J. Saxl,
Consulting Physicist, Providence, R. I.

IN TEXTILE materials, as well as in many other products of human manufacture, we oftentimes find a development that might be considered to follow a sort of spiral of progress. First, there is a natural produce which has been known for ages and which is of proved quality. Then synthetic materials try to improve on nature. After a time, the fundamental advantages of the new product are more or less forgotten, and science and technology turn back to an imitation of the original product. As a rule, however, and after a further period of time, the development reverts and produces again the fundamentally correct material in a form that is true to its purpose and structure.

We are standing today in the next to the last phase of the above-mentioned cycle. Originally the most widely used textile materials were cotton and wool. Both are characterized by a staple length never exceeding several inches and necessitating an overlapping and twisting of many individual fibers to produce yarns of the necessary length and strength.

3. Fabrics composed of the much-discussed casein fiber developed in Italy.



Cycle Swings Back

It was the goal of textile technicians, therefore, to develop what may be termed an endless yarn, a material that, as far as its longitudinal characteristics are concerned, has been greatly approached by synthetic yarns from rayon to acetate and again to nitro-cellulose and cuprammonium. Now, with a highly developed technic in the manufacture and conversion of practically endless-length rayon yarns, the cycle of production swings back to short-staple products. We cut the long yarns in short parts and then subject these short parts to complicated processes involving billions of dollars in layout for machinery in order to build them up again into those lengths that are necessary for yarns.

Of course, there are some reasons for it. The most important of them is probably the fact that a certain roughness of surface of the final fabric, a softness of handle and feel, and certain mechanical characteristics of yarn as far as its transversal specifications are concerned can be approached today more easily by a staple product. A certain amount of sliding of individual fibers upon each other gives this type of yarn an elasticity that is difficult to attain on long-filament yarns.

Spun rayon has also this advantage—it is smooth and does not itch. Dermatitis produced by certain wool products has not been found to exist with spun rayon, and as a result this material has been found eminently suitable for the manufacture of women's and babies' underwear, bathing suits, and similar products.

It is not said, however, that such effects could not be produced by a long-filament yarn that had been developed intelligently with full cognizance of the physical and chemical characteristics that produce those particular effects.

How is staple fiber of the above mentioned type produced today?

Methods of Manufacture

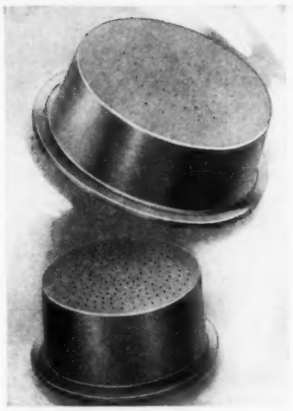
Fundamentally speaking, all of these staple materials go back to the synthetic yarns that originally were more or less correctly advertised as artificial silk. No use is made here any longer of rayon waste alone, but today new rayon is put into staple lengths and converted. In the production of such materials, the viscous solution, basically a cellulose derivative, is pressed through fine holes of a spinneret into a coagulating bath. It is pulled through the coagulating bath, stretch being applied to the thread first by a rotating glass drum and thereafter either by rotating bobbins or centrifugal force. Thereafter, the raw yarn is subjected to methods of bleaching, rewinding, and other preparatory procedure.

What concerns us here is the methods that are mechanically suitable for the staple production. Today's yarn production may range, generally speaking, from 50-denier 75-filament yarn (or .67-denier per filament) to 300-denier 44-filament (or about 6.7-denier per filament). Moreover, if we include such products as artificial horsehair, our range from the finest commercially producible yarn to the coarsest numbers embraces approximately the range from less than 1 denier per filament to more than 18 deniers per filament.

For economical staple production, it is desirable that the greatest possible number of individual fibers be produced per unit of time. This means an increase in the number of filaments—or, in other words, an increase of the number of holes per spinneret. There are economic limits to this, because beyond a given size it is not profitable to produce spinnerets of the customary form. New constructions of spinnerets have therefore been developed that take account of this fact; and today spinnerets with several hundred holes are commercially feasible and used both here and abroad.

Several Cutting Methods

In order to cut these yarns into staple form, several methods are being used.



5. Spinnerets developed especially for staple manufacture. Courtesy of Baker & Co.

One is to process the yarn through the final stage, then to let a number of strands of yarn having a similar appearance to sliver run through a staple cutter. In another method the cutting occurs shortly after the yarn has left the spinneret, and the staple floats within the coagulating solution and moves with this to a drain, through which the acid returns to the bath while the staple is transported on a conveyor and is subjected to further processing.

While the first-mentioned method produces staple of the shape primarily of long cylinders, the second method (whereby the immature fiber is permitted to float in the warm acid solution) permits the individual staple to curl up, in this manner producing a macroscopically wool-like appearance.

There is another method of production of yarn from which the individual filaments stick out that should be mentioned in this connection. This is a process developed recently whereby individual yarns are stretched sufficiently to break the long filaments. It is conceivable that, in a modification of this method, variations of pressure in the spinning pumps could be employed to produce thin and thick places in the yarn, but at irregular intervals. Then, if yarn of such type were subjected to pull, the filaments would fracture at the thin places, while the thick places would not be influenced.

A number of other methods are in existence that try by machine work to produce wool-like effects on the staple fiber. One involves the introduction of air bubbles of small size into the individual fiber, such air spaces serving as heat insulators; and it is claimed that this type of fiber shows better insulating properties than the ordinary fiber.

It also should be mentioned that staple fibers of the not too distant future may include non-cellulose materials, such as primarily silicates; although glass wool, to date, has not found application beyond a certain limited field of products.

In a discussion of new synthetic yarns, the slit materials should be mentioned. These are produced from broad sheets that are slit into individual strips. Since the cutting edge produces tension in the material, the fiber curls up and in this manner produces a characteristic crinkling which has been found desirable by certain manufacturers.

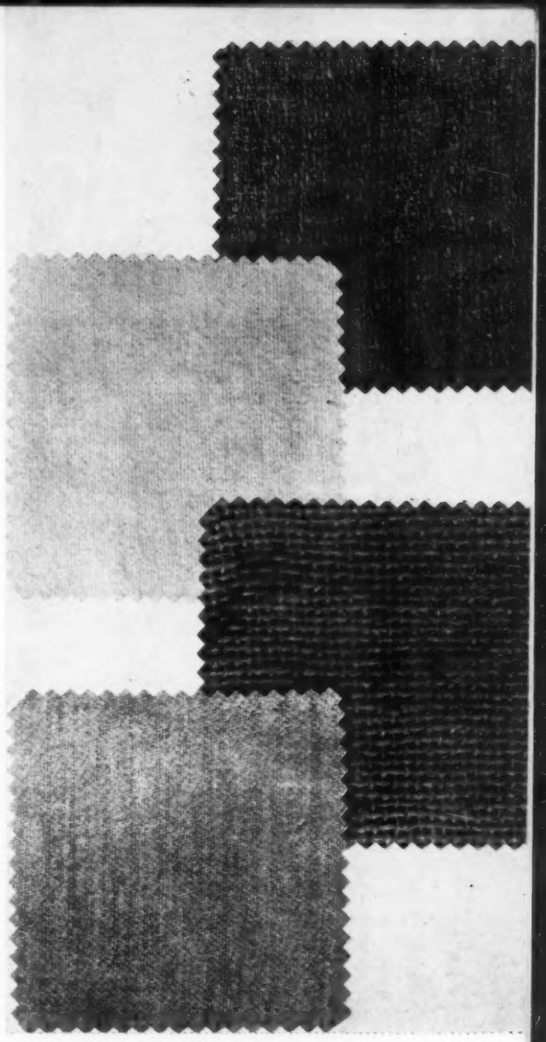
Throughout the industry there is a definite trend toward the development of materials greatly resembling wool.

A handicap to the development of these materials is that in certain academic quarters emphasis is too often laid on the fact that the microscopic difference between natural wool and synthetic materials is considerable. There is of course no question that the scaly organic structure of the animal hair does not exist in the synthetic yarn. We must understand, however, that for practical manufacturing conditions we have to deal with the total integrated action of the various microscopic components. It is entirely possible and practical to produce fiber the elasticity, handle, and warmth of which is comparable to the finest worsted without having to resort to a duplication of natural fibers in every detail of their microscopic structure.

Casein Wool

While it is not permissible at this time to give precise data on the last and most promising form of these products, consideration can be given here to some of the others that are advertised throughout the trade literature. Attention has been drawn recently to products of sour milk, primarily manufactured heretofore in Italy.

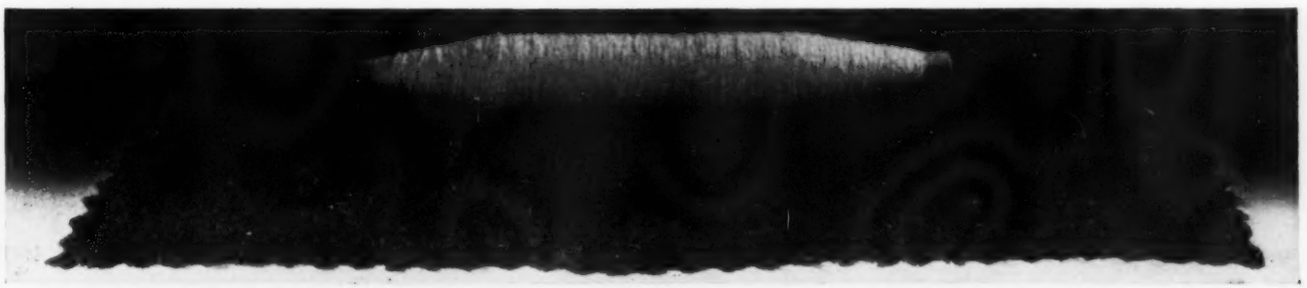
Due to the irregular coagulating properties of these caseinates, a somewhat curled and coarser effect is produced in the individual filament. The fiber is somewhat yellowish in appearance and, after being woven, becomes yellow and brittle with age. The breaking strength of the finished fabric is not satisfactory as yet. Also, certain difficulties have been encountered in dyeing and finishing this type of material. Last, but not least, it must be clearly understood that the production of caseinates is based upon the economic set-up of a primarily agricultural country. If caseinates would



4. Currently offered fabrics composed of the rayon staple produced by Du Pont and Viscose in this country.

1. A new yarn of synthetic staple fiber which Dr. Saxl believes is closest approach to wool yet made.

2. Fabric made of yarn shown at 1. This material is wool-like in appearance, handle, feel, warmth, and wear. It is cheaper than wool, will not itch the skin and is produced entirely within the United States.



become of importance in a primarily industrial set-up such as the United States, a shortage of the raw material (casein) would occur probably, which in turn would bring the price of this material beyond the range of competition with wool.

For these and other reasons, it seems that an industry for the production of materials greatly resembling wool must be based on raw materials of which there is a superabundance. Such materials are primarily cellulosic materials, be they based on cotton, slash pine, straw, corn, or wood pulp. There is no question that we have an abundance of such materials here and that it is more promising from an economic viewpoint to base production on them.

It may be mentioned in this connection that outstanding materials have been developed quite recently, photographs of which are shown herewith, that are based substantially on cellulose and which may be considered the nearest approach to wool today.

Methods of Conversion

In the converting of staple fiber to yarns and fabrics, several adjustments have to be made in the machinery in order to get the best production per unit of time. Staple yarns can be spun on ordinary cotton machinery if certain precautions are taken. Depending upon the denier of the individual filament, its chemical construction and physical characteristics, the speed and settings of the frame have to be adjusted. Generally speaking, it may be stated that with the exception of the last-mentioned synthetic product, all commercially known staple fibers require reduced production speed. This has to be carefully observed on all frames, beginning with the original picking and carding machines, as excessive speed, even as early as the carding machine, will produce an uneven sliver. The irregularities thus produced cannot be removed in commercial manner at the intermediary and final spinning frames, regardless of how much mixing is done. Later on, the setting of the spinning frames has to be adjusted in accordance with the predominant length of the staple fiber.

It has been found necessary in some instances, particularly when one deals with acetate bases, to add lubrication and moisture to the yarn. Comparable to wool, it is sometimes necessary to add emulsions of sulphonated oils and water. In this instance good use can be made of the practical experience which the worsted manufacturer has had on this type of yarn, and the adoption of certain worsted practices has been found necessary in many instances.

Staple Mixtures

It is particularly interesting to note that present developments seem to point toward staple mixtures as the next step in the production of profitable goods. It has been found that worsted not only mixes well with spun rayon but that the characteristics of both materials are improved over the individual product. Rayon and wool mixtures are spun successfully not only on the cotton system but also on the French and English worsted systems. There is no question that in the proper mixing of these fibers much can be done, particularly if we develop conscientiously, and not by rule of thumb. We must quantitatively and by known physical methods (as described in previous writings) study the yarns we develop to determine their softness and resiliency, the variations in their evenness, their hairiness, and their coefficient of friction.

In the mixture of various materials cotton is often used for giving yarns increased strength, while inexpensive or light materials such as rabbits' wool are used to give the material the hairiness desired. In all these processes, however, consideration must be given to the fact that the picker and the other production machines have a habit of producing more waste of certain types of materials than of others.

Certain improvements have been made also in the weaving of staple fiber. While originally staple fiber was woven with a starch-base size, it was later found more practical to use double- and triple-beam jobs and no size. It seems that the tendency is now again toward sizing; and new materials based on starches, dextrines, and gelatins, and the corresponding softeners, have been adopted recently.

Resiliency and Stiffness

The resiliency and stiffness of the finished cloth can be influenced by processes other than the manufacture of the original staple fiber. Among these influencing factors is the construction of the weave. During 1936 we find a recurrence of twill weaves in staple-fiber products.

Of course, the introduction of new staple materials having different dye indexes produces new problems in the maintenance of uniform shades by the dyer and finisher.

Interesting developments have been made in the dyeing and finishing of staple fiber and of mixtures containing it. The use of different dyestuffs in one bath, one of which affects primarily the rayon material while the other affects mainly the wool, has been perfected practically; and it is possible today to dye rayon and wool mixtures reasonably level.

On the other hand, if desirable it is of course possible to produce cross-dyeing effects.

The idea of depositing synthetic resins, such as the urea-formaldehyde condensations products, in the finished fabric in order to increase its "liveliness" shows promise. It is, of course, here as well as throughout the manufacture of spun rayon and similar materials that we have to be careful not only that we deal with principles that are qualitatively sound, but also that we work correctly from a *quantitative* viewpoint.

The time when the overseer of the spinning room determined the quality of his yarn merely by looking at it and feeling it are definitely over. Specifically speaking, the variations in evenness of the yarn, the mechanical hysteresis of the yarn, and other significant characteristics enter quantitatively into cloth construction. The number of picks, the interlacing in order to produce special ribbed effects, and finally the finishing have a lot to do with the resiliency of the finished staple-fiber product.

If certain processes are not quantitatively correct good intentions may shoot beyond their goal, with the result that excessive stiffness will produce sheet-like materials that are undesirable for human wear. Such hardness and brittleness may be produced by the excessive deposit of synthetic resins, as well as by errors in the weave construction, in the yarn construction, and in the original nature of the raw material. In every single step the material has to be handled intelligently and in accordance with up-to-date knowledge of today's physics and chemistry, if the desired results are to be achieved with the least expenditure of time and money.

In connection with machinery used in handling staple, the following data have been recommended by the Victor Ring Traveler Co., Providence:

Layout for Rayon Staple
1½-denier, 1½-inch

Breaker Picker
2-40″ porcupine beaters.....480 r.p.m.
Lap weight.....14 oz. per yard
Relative humidity.....60-65%
Cleaning bars on pickers covered over. Grid bars uncovered.

Finisher Picker
1-18″ Kirschner beater.....650 r.p.m.
Lap weight.....12 oz. per yard

Card
R.p.m. doffer.....6.5
R.p.m. lickerin.....320
Card sliver.....40 grains per yard
Production.....240 lb. per 40 hr.
Relative humidity.....60%
Top-flat speed on cards,
1¼ per min. past a given point
Feed plate on cards set as close as possible—
.010″ on long-nosed plate
.015″ on short-nosed plate
Mote knives set.....022″ from lickerin
Mote knives set.....029″ from lickerin
Percentage plate on cards set as close as possible; or in other words, set close enough to get a strip all the way across the plate.

First Drawing
R.p.m. front roll.....300
Sliver.....53 grains per yard

Second Drawing
R.p.m. front roll.....300
Sliver.....60 grains per yard

Slubber
Draft.....60-hank from 60-grain sliver
R.p.m. spindle.....550
Twist per inch.....55

Intermediate
Draft.....1.50-hank from .60-hank dble.
R.p.m. spindle.....625
Twist per inch.....926
Relative humidity.....50%-55%
(This is for 9 x 4½″ frame)

Fine frame
Draft.....3.00-hank from 1.50-hank dble.
R.p.m. spindle.....750
Twist per inch.....1.50
(This is for 7 x 3½″ frame)

Jack Frame
Draft.....7.00-hank from 3.00-hank dble.
R.p.m. spindle.....1025
Twist per inch.....2.07
(This is for 6 x 3″ frame)

Knit Goods on Way Up . . .

Hosiery, underwear, outerwear branches show improvement in varying degrees

HOSIERY—In reviewing hosiery industry developments through 1936, the market analyst must "pull his punches" or he will become a common scold. For assuredly, the year's picture is exasperating enough: On volume it was a period of exceptional activity with at least one month setting an all-time high record for sales; on profit, with a few exceptions, it was a period of neglected opportunity. With respect to profits the happiest phase is that which the industry is now entering; prices are moving this year into more normal relationship to increased costs. This trend, conservatively maintained, should make for a better financial showing during 1937.

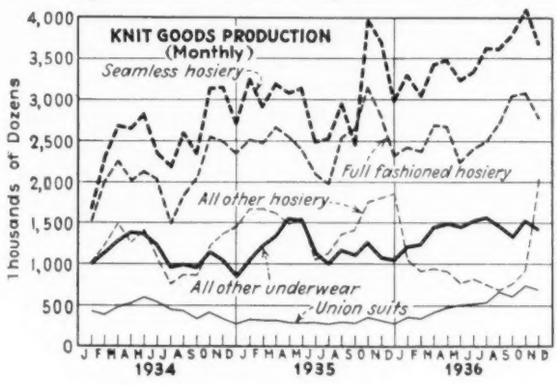
Highlights of 1936 were: Shipments totalled nearly 115,000,000 doz. pr., some 9% above 1935, with October reporting the unprecedented monthly figure of 4,131,290 doz. pr.; prices remained virtually the same all year, despite substantial rise in raw silk and other costs; various strikes caused widespread labor uncertainty, this being accentuated by abrogation of the Philadelphia agreement; drastic jump in imports from Japan developed a serious problem for the seamless cotton branch; and, finally, completion of the much-needed industry survey by the National Association of Hosiery Manufacturers, pointed the way to meet a long-felt need.

The more closely the 1936 picture is studied, the more apparent becomes the industry's dereliction as regards profits. During the year, and especially in the second half, the essential factors were present, to warrant carrying the industry forward into a profitable price position: First, customer attitude was receptive to higher hosiery prices, this attitude being due to (a) upward price trend in other industries and (b) knowledge of increased hosiery costs; and second, the advent of "ringless" hosiery supplied the necessary sales argument for an upward revision. However, the industry failed to avail itself of either of these opportunities: "ringless" hosiery, hopelessly snarled in litigation, lost some ground in the higher brackets and became a bargain-counter item; hosiery prices generally lagged far behind other apparel prices. But the picture is not *all* black. Certain companies refused to follow the trend. They insisted upon profit, they merchandised vigorously, and they benefitted accordingly. It is encouraging also to note that the total number of hosiery companies making a profit in 1936 was above that of 1935.

The prospects for 1937 are decidedly brighter. Profit outlook is more propitious than in some years past thanks to five main favorable factors: (a) continued economic improvement generally; (b) industry's trend toward firmer price policy; (c) industry's growing disposition toward solving its problems through coordination, as in NRA days; and (d) availability of the National Association's survey data, which should help to end the industry's era of "profitless prosperity."

UNDERWEAR—Always conservative in management policies, the underwear mills were rather too conservative as regards prices during 1936. True, they went the hosiery branch one better on that point: underwear prices rose approximately 10%. However, manufacturing costs advanced appreciably more than 10%, with the result that, though sales showed a decisive rise, the industry lost rather than gained in profit position.

Statistically speaking, the industry's position was excellent at the year-end. Production and sales were about equal during 1936, the figure in both columns being 46,000,000 doz., against 40,000,000 doz. in 1935. However, as 40,000,000 has been the industry's yearly average for the last decade, it is unlikely that 1937 will show any marked sales increase over 1936. This suggests the industry should count on higher prices rather than higher volume, for necessary financial improvements this year.



Viewed in perspective, 1936 was marked by various vital developments in the underwear industry and these fall roughly into three divisions: (a) Increase in manufacturing costs, with prices rising inadequately; (b) a definite turn to a seller's market, with marked shortage of certain lines in concluding months; and (c) pronounced improvement in labor relations, through the Underwear Institute's insistence that the industry take the initiative in personnel problems rather than wait for action by labor itself.

Prospects for 1937 are very good. Underwear mills entered the new year with virtually no carryover, and with the heaviest bookings of unfilled business in 10 years. Two price issues call for consideration: (a) the need for an immediate rise to equalize the added costs now faced; and (b) the prospective need for a second rise to balance the expected 1937 additions to costs (in labor, raw cotton, yarns, etc.) if and when these develop. Caution is necessary to avert any "runaway trend" in increasing either prices or production. However, the overproduction tendency will be restrained by two factors: (a) limited available trained labor; (b) current trend toward restriction of operating hours.

OUTERWEAR—Outerwear's record during 1936 was definitely on the constructive side. The industry succeeded both in improving its immediate position and in laying the foundations for further substantial progress this year. Three developments were foremost in 1936: (a) a two-ply industry improvement bringing increased sales and higher prices; (b) industry's participation in cooperative promotion to a degree never before attained; and (c) the big exodus of mills from New York Metropolitan area. The benefits of *a* and *b* are self-evident. The significance of *c*, the exodus, is that it took 12% of New York's 400 mills out into low-cost areas and thus promises to intensify competition and to extend the contract system of production within New York. Sales prospects for 1937 are excellent, thanks largely to the vigorous merchandising program of the Knitwear Institute. Profit prospects are equally good, with one important IF—that competition should not become so intense as to deprive the industry of the benefits of the rise.

Ingenious Mechanisms

Serve to increase design capacity, improve product quality, and step up production

THE knitting branch of the industry during 1936 upheld its reputation for introducing the greatest number and variety of new or modified mechanisms. Many were the changes and improvements made in the full-fashioned hosiery machine, which today permits the greatest opportunities for increased automaticity. A new circular machine for producing fancy bathing-suit fabrics has already made something of a sensation in the trade. A new latch-needle body knitter affords great uniformity of stitch. New warp knitting machines operate at speeds previously unheard of. The most revolutionary innovation, although still awaiting wide acceptance, is the electrical "jacquard" for flat knitting.

However, the year was also notable for producing no important improvements in circular hosiery machines. It is perhaps not surprising that we have arrived at a "breathing spell" in the rapid evolution of the women's seamless stocking and the men's fancy half hose, because even the most ingenious inventors require time out once in a while and the industry needs opportunity to digest the fruit of their previous efforts.

Guide to the Pictures

1. Thermostatically controlled water is pumped through hollow friction shaft of Reading full-fashioned hosiery machine to aid permanency of settings and eliminate wear caused by hot shaft. (Textile Machine Works)

2. Improved splicing and reduced mechanical wear obtained on full-fashioned machine by duo-type friction boxes, additional friction-box rod, and driving mechanism furnished in conjunction with half-speed shock absorber. (Textile Machine Works)

3. Automatically controlled humidification within yarn boxes is afforded by new "Conditionaire" applied to full-fashioned knitting. (Textile Machine Works)

4. Double-spindle reinforced-selvage attachment produces French heel, pointed heel, black heel, and symmetrical and non-symmetrical shadow clocks on full-fashioned leggers, and produces semi- or full-cradle sole and various reinforcements on footers. Additional needle-bar rocking action for reinforcing is furnished by improved camshaft rocker. (Textile Machine Works)

5. New hosiery examining form is divided lengthwise and expands stocking from toe to welt in proportion to width of fabric. Stocking is turned automatically when pulled on. (Textile Machine Works)

6. Single-unit stockings can now be knitted on Wildman's single-head full-fashioned hosiery machine. This photo shows heel tabs completed and transfer bar in position to return instep stitches to needles. (Wildman Mfg. Co.)

7. This photo shows single-head, single-unit full-fashioned machine knitting foot after heel tabs have been topped on and transfer bar swung up. (Wildman Mfg. Co.)

8. New "heeler" machine knitting tabs on leg and foot produced as single unit on Einsiedel-Reiner "Combi" machine. (Robert Reiner, Inc.)

9. When this single-unit Schubert & Salzer full-fashioned hosiery machine is ready to knit heel tabs, a special comb rises on each side of instep to press tab needles only. (Alfred Hofmann, Inc.)

10. Kalio "Complet" machines are now equipped with welt turner. Welt bar swings outward with first row of stitches and swings back to transfer stitches to needles. (Louis Hirsch Textile Machines.)

11. Four-feed, 5½-in. ribber which will change automatically to one-feed for making welt and loose course, affording much simpler and easier transferring operation, as well as improved appearance, four-feed production, and four-feed spacing of rubber lay-in. (H. Brinton Co.)

12. Ankle-length hose with rib top containing rubber and produced on four-feed ribber capable of automatic change to one-feed. (H. Brinton Co.)

13. Rib-body machine used primarily for bathing suits. Will make plain rib and various fancy designs in raised stitches. With pattern wheels on dial as well as cylinder, will make two-faced fancy fabrics. Built in 24-in. with 16 feeds and 28-in. with 18 feeds. (H. Brinton Co.)

14. Raised-stitch effects produced on new rib-body machine, which is known as PR (pattern-rib) model. Wales shown horizontal. (H. Brinton Co.)

15. New cam ring permits knitting vertical float stripes on cylinder of automatic double-butt tuck rib-body machine, which in 1935 was equipped with special swivel cams in dial operating needles of different butt and latch lengths. Sample shows present possibilities in this quick-pattern-change machine. Wales shown horizontal. (Scott & Williams, Inc.)

16. Latch-needle body machine which feeds its yarn under stroboscopic control, measures its stitch by means of both needles and sinkers, and carries 23 feeds on a 21-in. cylinder. (Hemphill Co.)

17. Electrical "jacquard" applied to two-bed flat knitting machine producing rib Designs, merely painted on copper sheets, reproduce themselves in fabric without any intermediate layout of design fields or punching of cards. (Lefier Corp.)

18. Emil Wirth tricot machine which will operate at 400 courses per minute on suitable material. (Robert Reiner, Inc.)

19. Emil Wirth milanese machine designed to operate at 200 courses per minute without danger of frayed yarns. (Robert Reiner, Inc.)

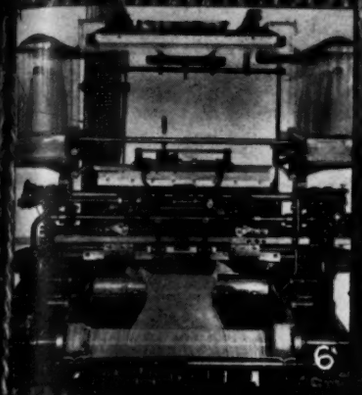
20. Tricot machine with new stop motion and capable of operating at better than 300 r.p.m. and 40 racks per hour. (Collins Loom Works, Inc.)

21. Alois Schlick sectional beaming machine for warp-knitting mills. Capable of a speed of 450 yd. per minute. (Robert Reiner, Inc.)

22. Altemus rewinding machine which will recover silk from three-carrier full-fashioned hosiery press-offs. (Fidelity Machine Co.)

23. Hosiery-inspection forms made of Micarta with steel reinforcing. (Westinghouse Electric & Mfg. Co.)

24. Automatic transfer machine which also serves as a table on which folded stockings are banded and boxed ready for shipment. (St. Joseph Iron Works)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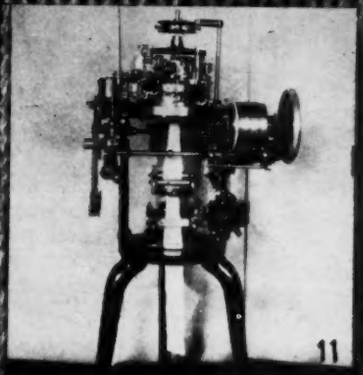
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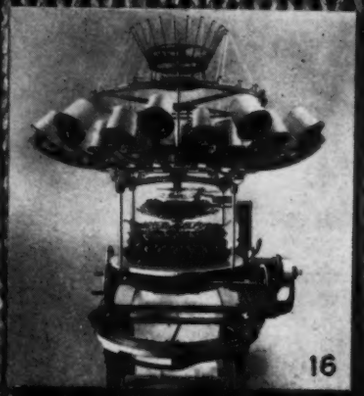
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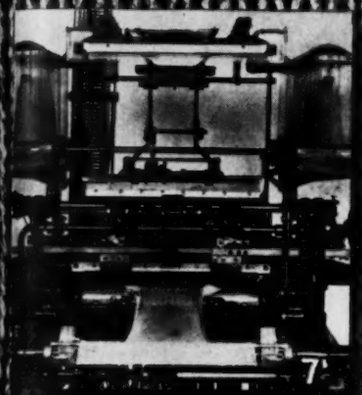
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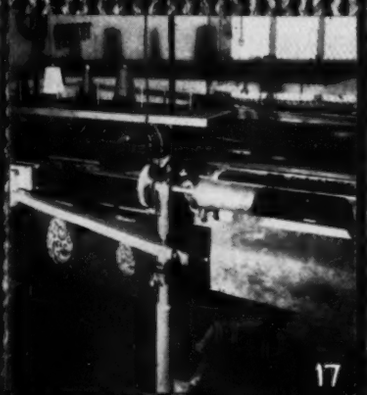
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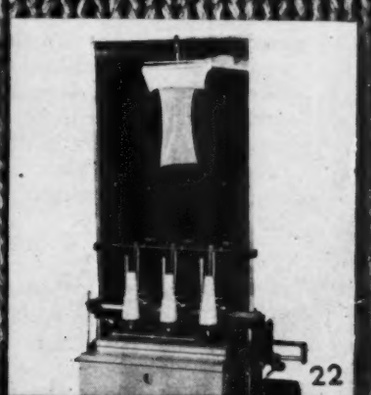
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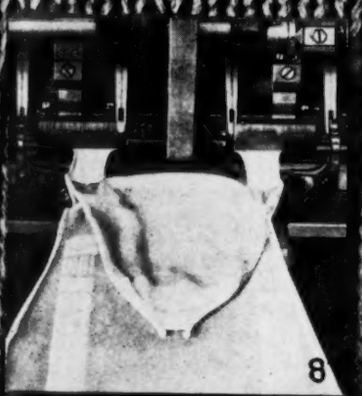
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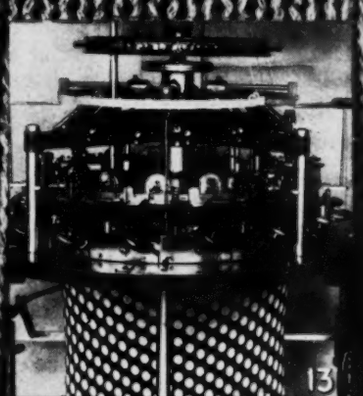
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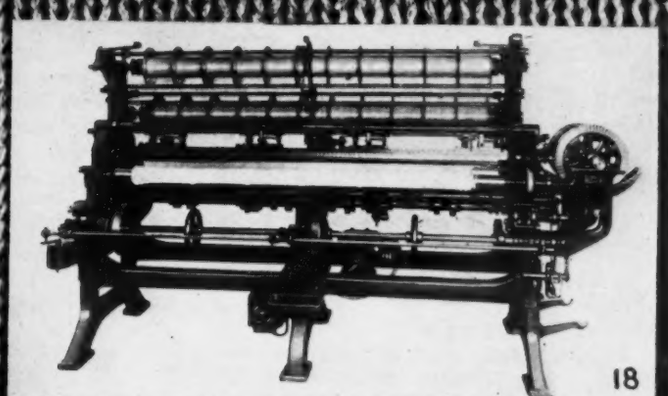
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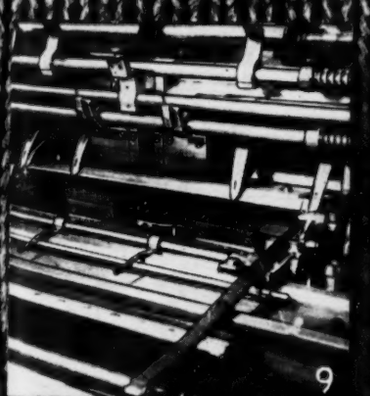
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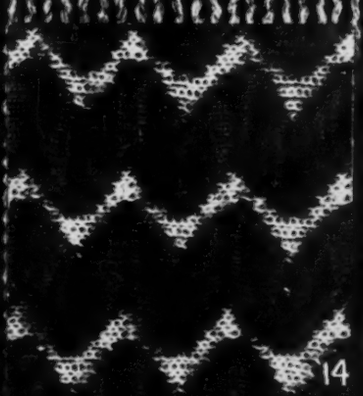
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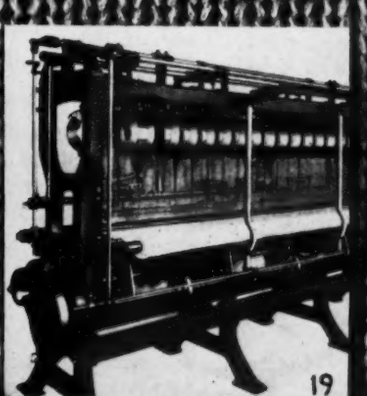
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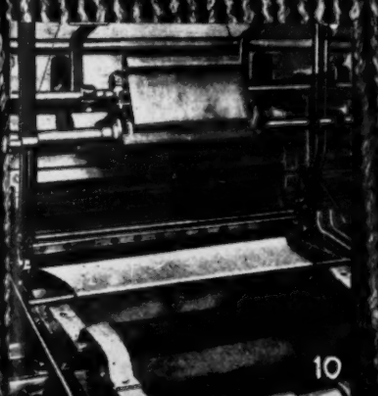
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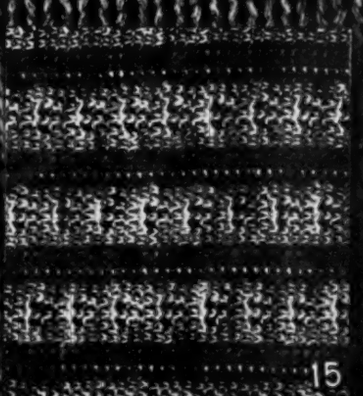
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PRACTICAL HELPS

for Knitting Overseers

A WESTERN MILL possessing a lot of jersey-cloth machines had the idea of making underwear. They hit upon a plan of making a stitch that looked like a rib by using every other needle as a tuck. Another mill got away with no expense of pattern wheels by having long-butt needles, spaced for a pattern, that had a two-way cam. Actually it was really no cam—just a thin piece of steel like a clock spring arranged to pick up the long butts only.

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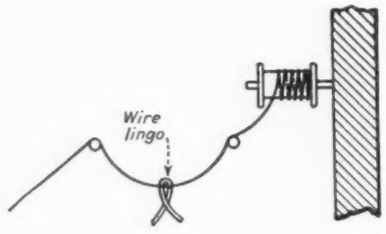
WHEN FABRIC DOES not come off a raschel knitting machine straight, try the following: Leave four threads in each selvage off the main warp beam and replace these ends with threads from spools carried on the



spool board running across the top front of the machine; use easy-running spools, with wire lingoes supplying tension, as shown in the diagram. Another method of tensioning the selvage threads is to have a wire running across the machine, controlled by a pliable spring at each end, over which the selvage ends pass.

•

FABRICS KNITTED of rayon at a low relative humidity will show pinholes and unevenness. Experience has shown that, for knitting rayon, high relative humidity, say 65 to 75%, gives the most advantageous results.

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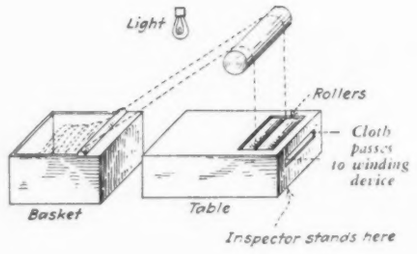
THE MACHINE SHOWN in the illustration is good for examining a considerable length of fabric at one time. The inspector takes one end of the cloth, throws it over a roller which is placed about 10 ft. higher than the basket, and passes it through a set of draw rolls which pass it to a winding device. An arc-shaped spreader is attached to the first basket to stretch the goods slightly, and a



bright light is thrown on the fabric from a lamp placed as shown. A 100-yd. roll of cloth can be inspected in 30 min., and the operative has two chances to see each defect.

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STITCH UNITS on full-fashioned machines are usually set as nearly alike as possible by running on to the slack-course cam just far enough to relieve the pressure on the stitch-cam rollers and then turning these rollers by hand to make certain that they are under equal pressure. A better way is to separate the rollers from their cams, insert a feeler-gage blade, and adjust one unit to the other. Here the horizontal dial-gage measurement between the top table and the back of the needles affords a more accurate adjustment of the two stitch units.

•

A YARN TAKE-UP device, which is actuated independently of the yarn and which allows the yarn to be drawn into a uniform stitch in seamless knitting, is shown in Figs. 1, 2, and 3. Part *A* is an adjustable yarn tension with an electromagnetic release *E*. Part *B* is a yarn trap which holds the yarn firmly during the retrieving part of the cylinder oscillation and is also electrically operated by *F*. Part *D* is the yarn take-up lever which is connected with armature *C* through shaft *H*. All these are mounted on Part *I*. When the cylinder reaches the end of each oscillation, an electrical contact is made by means of a timing device on the under-drive mechanism and maintained until the cylinder reaches the midpoint. This contact causes lever *D* to become active, and at the same time causes tension *A* to be released and trap *B* to be closed, holding the yarn until contact is broken. Then *A* becomes active, *B* is released, and *D* goes to its normal position, as is shown in Fig. 2 of the illustration.

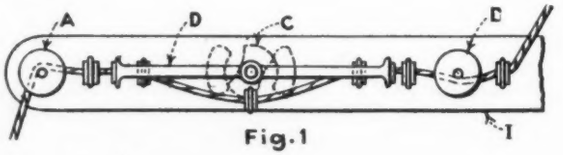

Fig. 1

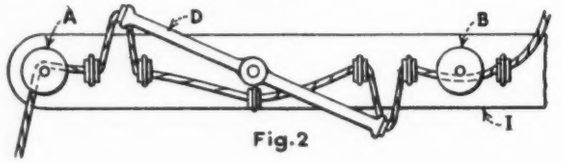

Fig. 2

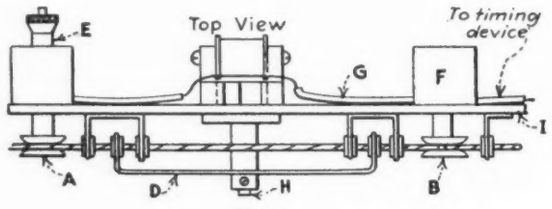

Fig. 3

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CAREFUL FILING of the jacks will do more than anything else to eliminate vertical lines in full-fashioned knitting. Make two straightedges from steel, a little longer than the heads and approximately ½x1½ in. thick. Clamp one of these to the back of the head on a line with where the slur cock wears the jacks, with the narrow side of the straightedge against this place, holding all the jacks in a forward position. Place enough shims at the ends of the heads to allow just a little play. Place the jack head in a vise in such a manner as to permit the weight of the jacks to lie against the straightedge. In this position merely rubbing the other straightedge, which has been previously coated with Prussian blue, across the striking edge of the jack will make all the unevenness apparent. Care should be exercised in filing this edge in order to be sure that the proper contour of the jack is retained.

•

YELLOW SILK STOCKINGS may be caused by using silk taken off the machine and set back and allowed to accumulate. If wet stockings are dried in a dryer where the temperature is too high, this also will yellow them. Another factor is that some throwing oils and back-winding oils are more susceptible to oxidation than others and will cause yellowing with age.

These items have been culled from the 1936 issues of TEXTILE WORLD.

Out of the Red

Profits in cotton finishing division offset losses in silk and rayon section

IN MORE ways than one, 1936 proved to be a banner year for cotton finishers. Not only was a new record established for activity, but for the first time in many years the industry as a whole was able to show a profit. For the silk and rayon finishers, unfortunately, conditions were less propitious. Production fell off and losses continued.

At the close of 1935 the cotton finishers had decided that, if they were to get on a profit-making basis, either a sizable increase in volume of business or the establishment of higher prices than had prevailed in the past was necessary. Unable to foresee any great increase in volume for the first half of 1936, the job finishers were prompted to add a surcharge of 1½% of the total of each bill rendered on orders received after Jan. 1. Despite some opposition on the part of converters, the finishers for several months had little difficulty in collecting this extra charge.

For the first half year, 77 finishers reported to the Federal Trade Commission an average return of 3.75% on their textile investment, equivalent to 7.5% on an annual basis. Then one finisher got panicky and dropped the surcharge; others followed suit and—in many cases—refunded what they had already collected. Finally only one or two were still sticking by their guns; and it appeared that the opportunity for the industry as a whole to make sustained profit for the year was gone.

Happily, however, business made a sharp upswing which carried production to a new all-time high. As a result of this increased production, overhead costs were reduced, and most of the well-managed plants were able to show a profit for the entire year.

Total production of cotton finishers in 1936 was 16% over that for 1935. The biggest gain was in dyed goods, which had a 22% increase. Production of bleached fabrics and prints increased 12% and 11%, respectively.

No official figures are available on activity in the silk and rayon division, but TEXTILE WORLD estimates total production at 418,000,000 yd. in 1936, as compared with 440,0000,000 yd. in 1935, 406,000,000 yd. in 1934, and 474,000,000 yd. in 1933. Financially, the silk and rayon finishers made the poorest showing of any group in the textile industry. For the first six months of 1936, 65 companies reported an average loss of 3.03% on their textile investment. The picture for the entire year is not expected to be much, if any, brighter.

Sales of Domestic Coal-Tar Dyes

YEAR	LB.
1927...	98,339,000
1928...	98,303,000
1929...	106,071,000
1930...	89,972,000
1931...	85,220,000
1932...	73,591,000
1933...	98,229,000
1934...	84,309,000
1935...	97,826,000
1936*..	111,000,000

* TEXTILE WORLD estimate.

Danger of a strike in the silk and rayon finishing division and the possibility of an exodus of leading finishing plants from the Paterson, N. J., area were averted when a new two-year contract with the union, to replace the one which expired on Aug. 31, was accepted by most of the employers. United Piece Dye Works refused to sign and closed down its plants from late in August until early in November, when it reached an agreement with the union.

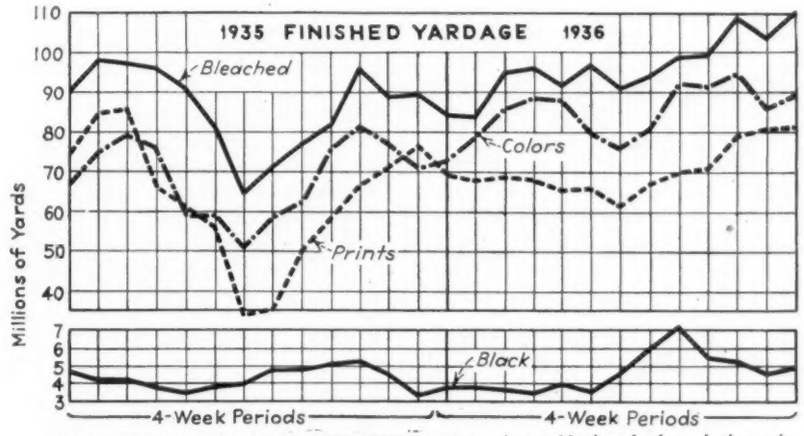
At the close of the year, following wage increases in the cotton branch and higher costs generally in the silk-rayon division, finishers in both branches advanced their prices.

Future Outlook

What is the outlook for 1937?

In the silk and rayon finishing industry, it does not appear that anything less than a miracle can prevent a recurrence of the heavy losses which most companies have experienced for several years. Well-intentioned as they may be, the various plans which have been proposed to "stabilize conditions" in that division fall far short of what is needed. Not "stabilization," but "complete reorganization" is necessary if that branch is to survive much longer in anything like its present size and importance.

In the cotton division, the problems of surplus equipment and of competition between mill and job finishers and between northern and southern plants still remain to be solved. However, the recent price advances should cover wage increases, higher costs of supplies, and other expense items which have risen, and still leave a little over. Cotton finishers got a taste of profits last year. If they will stick together and keep their charges up where they belong, they should be able to get a somewhat bigger taste in 1937.



COTTON FINISHING ACTIVITY. Data from National Association of Finishers of Textile Fabrics. Volume processed by reporting companies was 3,333,280,000 yd. in 1936, as compared with 2,897,554,000 yd. in 1935. Total volume processed by cotton finishers in 1936 is estimated by TEXTILE WORLD at 4,780,000,000 yd. against an estimated volume of 4,160,000,000 yd. in 1935 and a known volume of 3,871,632,000 yd. in 1934. Comparable figures are not available for previous years. TEXTILE WORLD'S estimate is 4,400,000,000 yd. in 1933, 4,700,000,000 in 1929 and 4,100,000,000 for 1923-25 average.

The Textile Quintuplets

Phenomenal growth of five new finishes leads technical advances in processing divisions

ONE of the first things which this gray-headed reviewer heard when he entered the textile industry was the statement: "The finish sells the goods." Undoubtedly the finish enhanced the appearance of the fabric and made the goods sell. As a rule, however, the benefit was temporary; any effect obtained in finishing disappeared at the first laundering; disappointed and dissatisfied customers were the result. Take cottons, for example. Finishing consisted mostly of running the goods through starch and a softener, drying, tentering to width, calendering, and then—if the finisher had made them too stiff—running them over a button breaker.

"The finish sells the goods." Today the old slogan has taken on a new meaning. Certain of the new finishes developed in the last few years—most of them having a lasting effect—add so greatly to the beauty or utility of the fabric that they have an undeniable consumer appeal. They make for repeat business. Just look at the record of growth of the five new finishes which might be likened to that other set of lusty youngsters, the Dionne quintuplets.

Finishers produced twice as many crease-resistant fabrics in 1936 as in 1935. Output of water-repellent cloth increased 50%. Mothproofing went ahead by leaps and bounds. One plant doubled the number of its customers for permanent-finished cottons. Production of transparent silks in 1936 was twice that of 1935, four times that of 1934. An older brother, Sanforizing, grew over 800% during its first five years, and continued its phenomenal growth during 1936.

Without question, the outstanding technical development in the processing divisions in the last year has been the greatly increased production of new finishes of various types. In addition to those just mentioned and others which have been noted in previous reviews, there are still other finishes which have been developed more recently and which as yet are not so widely known or used. Likewise, in dyeing and printing there have been several innovations which have permitted production of novel effects in the finished fabrics. A new process of flock printing, an improved method for obtaining discharge prints on acetate fabrics, and refinements in lacquer printing are examples.

Turning to those processes and chemicals which have been announced during the last twelve months, one finds it impossible to single out any one development which overshadows the others. Rather, there are a number of such developments which are of potential importance and which should be followed closely. These new processes include a method for lusterizing cotton by subjecting it to a combined chemical and mechanical treatment while it is in the form of picker laps, a method for imparting a permanent crinkle to viscose by treating the fibers with urea-formaldehyde resin followed by a passage through hot, fluted rolls, a method of metallic printing said to give non-tarnishable gold or silver designs, a method for the photo-lithographic engraving of printing rolls, a waterproof finish obtained by means of a synthetic rubber-like material, a new indigo-dyeing process designed to give complete impregnation of the yarn, and a flameproofing process which prevents ignition of fabrics under any circumstances.

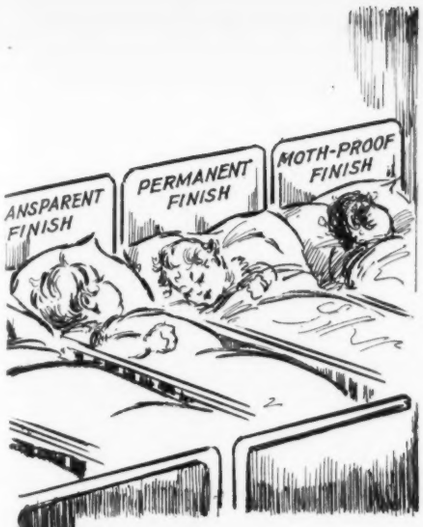
New Chemicals

Of the 25 or more new chemicals announced in TEXTILE WORLD during the year under review, there are two or three which are quite different from anything available heretofore. One of these, a synthetic, water-soluble lubricant for wool-stock, is said to possess the proper fiber-softening and lubricating properties necessary for satisfactory carding, combing, and spinning, and to have several other important advantages. New also is a series of non-oxidizing finishing oils produced by subjecting sulphonated oils to the double reaction of phosphation and aminizing, and developed for the purpose of preventing randicity, odors, and discoloration of finished goods on the shelf or in storage. Another innovation is a latex compound employed in discharge printing.

Several new wetting agents and detergents suitable for use where soft water is not available have made their appearance, as well as a new hosiery degumming agent, a kier-boiling assistant, a water-conditioning chemical, three or four new types of synthetic resins, new mildew preventives, emulsifying agents, water repellents, mothproofing compounds, etc. For sizing acetate and other synthetic warp yarns, a new prepared size originally developed by one of the world's largest producers of acetate yarn has been made available.

Dye Progress

In looking through the list of dyes announced last year, one is impressed with the fact that about 20% of the total number of new products have been developed for use on cellulose acetate, and that vat and azoic colors account for a somewhat larger percentage. The range of direct-dyeing dyes for acetate first developed in England two years ago has been extended; one American manufacturer has brought out a series of water-soluble sulphur blacks, and another has introduced a range of vat dyes in grain form. Four of the leading German and Swiss dye manufacturers have adopted a new system of indicating the fastness to light of dyeings of various depths and on various fibers. Under this system, the poorest fastness to light will be marked 1, and the best will be marked 8. The translation of the numerals into words will, therefore, be: 1, small; 3, moderate; 5, good; 6, very good; 7, excellent; and 8, outstanding.



Also from Europe comes news of a continuous dryer built originally for drying rayon staple, but which has other textile applications. An improved stock dryer developed in this country embodies a new system of air recirculation and has a capacity 25 to 50% greater than older models. Rayon finishing equipment continues to be refined, as witnessed in several new models of embossing machines and decating machines. One device of special interest to finishers is a motor-operated electric cloth guider suitable for use on all fabrics ranging from voiles to heavy ducks; a feature of this guider is that pressure between the rolls can be adjusted instantly and the rolls parted to permit the passage of seams.

Many improvements have been made in bleaching, dyeing, and finishing equipment; but there have been very few radical changes in design. One entirely new machine, which was first shown publicly last spring, is a sueding machine which produces a nap or pile on fabrics made from continuous-filament rayon or silk. The suede effect can be had in full width or in any width of stripe lengthwise. Wool, cotton, or linen fabrics can also be handled. In the machine, the fabric is held on a spongy, clinging pneumatic bed, which holds it in both length and width. As the fabric moves forward under abrasive rollers, the surface filaments are cut to about 10% (the amount is adjustable) of the thickness of the cloth, thus producing fibers to form the nap.

Last year was reported a new process for dyeing wool goods at low temperatures. Since then a patent has been granted in England covering equipment for use with that process.

Demand for better and better quality in finished fabrics has led to the development of test methods and apparatus for use in control of raw materials, processes, and finished products. Thus, a new method for determining the total fatty acid content of soaps and fats has been evolved and a method for measuring pebble in crepe fabrics by making a plaster of Paris cast of the fabric has been developed. Active work is now being carried out on the development of a standard method for testing the crease resistance of fabrics. New apparatus includes a dual color-matching lamp which gives a light intensity approximately four times the daylight available at a window and which furnishes one light quality equivalent to overcast sky and another equivalent to horizon sunlight; a reflection meter designed for the objective determination of whiteness; a photo-electric reflectometer for determining reflectance, opacity, and color of textiles; and a recording spectrophotometer for the analysis of color. In addition, there have been brought out two pH meters, an instrument which measures yarn stiffness and another which determines fabric stiffness, apparatus for testing the susceptibility to shrinking of fabrics upon dry-cleaning, and a device for testing fastness to crocking.

Research Developments

Hampered by lack of whole-hearted moral and liberal financial support by the industry in general, the comparatively small groups of research-minded textile men continue undaunted in their efforts to popularize textile research in this country. Some of the projects initiated by the American Association of Textile Chemists & Colorists, the United States Institute for Textile Research, and the Throwsters Research Institute are well under way, and during the last year have yielded valuable information, previously unknown, on such subjects as the effect of alkalies on wool, properties of vat printing pastes, rayon warp sizing, mercerizing of cotton and creping of rayon fabrics. Funds are now being solicited to make possible an investigation of textile drying—one of the most important, but least understood of textile operations. Within the next few years, the research organizations should be able to offer tangible proof of their thesis that research pays dividends. When that time comes, textile-mill owners no longer will have to be begged to finance cooperative research. Instead, in the good old American way, everybody will jump on the band wagon and money will be supplied in plenty to make this country the leader in textile research. The era of rule-of-thumb methods is passing. Slowly, but inevitably, an era of progress based on fundamental knowledge is dawning.

For 1937 we can predict with confidence a further extension of the uses of many of the chemicals recently made available to the textile industry; we can foresee also an increased production of certain of the new finishes. Another certainty is the further improvement of present types of equipment and introduction of new types designed to take full advantage of these chemical developments. There will be a growing appreciation of the need for the services of trained chemists to supervise the purchase, preparation, and application of the materials now in use and coming into use in textile processing. Perhaps not this year, but before long, textile men will become aware of the existence of chemical engineering profession, and will find that the experienced chemical engineer can effect improvements and economies in many operations involved in textile processing.

PRACTICAL HELPS

for Processing Overseers

PROPER SELECTION of dye nets can effect a real economy in the dyehouse. In dyeing chiffon hosiery, use of fine-mesh nets weighing only ½ lb. will permit dyeing of a 110 doz. lot, giving a 10% increase in production over that possible with the usual 1-lb. net. Frequently from 6 to 10 in. can be safely removed from the regular 30-in. net for chiffon hosiery, with the resultant possibility of gain in pay load or an increased bath ratio, which tends to decrease possibility of chaffing. For very sheer hosiery, it is desirable to use a bag of loosely woven cotton within the dye net.

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CONTRARY TO A FIRST opinion, it is preferable to dye staple-fiber fabrics in a reel machine when a full and wool-like handle is desired. Dyeing time should be kept as brief as possible; friction between the fabric and the guide roll should be reduced to a minimum by mounting the roller in ball bearings, and by making the roller as light as possible and having its surface free from all roughness.

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WRINKLES OR CREASES formed in acetate taffetas during wet processing are difficult to remove. Care should be taken, especially while the goods are on the jig for scouring and dyeing, to avoid these defects. If, despite all precautions, creases or wrinkles are formed, decatizing will aid greatly in removing them.

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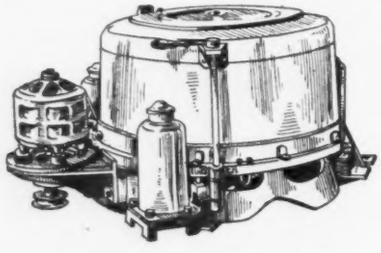
VARIATION IN THE FINISH of full-fashioned hosiery was traced to



uneven extraction. Experiments determined the correct time of extraction for each style number, after which the extractors were equipped with automatic time-control devices. No further trouble was experienced from uneven extracting.

These items have been culled from the 1936 issues of TEXTILE WORLD.

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THE LIMITING FACTOR which in most instances controls the speed of production in printing is that of drying. While cans may be suited fairly well for cotton, acetate materials are better dried in machines utilizing the principle of rapid-moving hot air. Many plants can increase their production from printing machines from 35 to 40% by changing their drying equipment better to meet present-day requirements.

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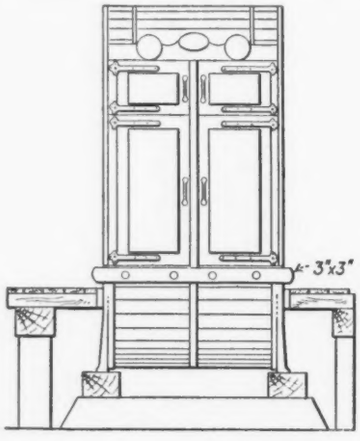
CATCHING OF GOODS on the lower corners of the fulling-mill doors when loading up from the floor can be eliminated by fastening a 3x3-in.



piece of white pine, maple, or cypress across the front of the mill extending 1½ in. beyond each side and directly under the doors. The outside edges and both ends should be rounded. With this arrangement, the goods cannot be caught and ripped while loading or when running in again after measuring.

•

A STUDY OF THE TIME factor involved in mercerizing showed that the reaction between the caustic and the cotton is virtually complete in 75 sec. Working on this basis, mercerizers have increased the number and height of the rollers in the caustic saturation box and the amount of cloth between the last nip of the mangle and the tenter. In this way, they have been able to obtain satisfactory results at cloth speeds of 60 to 65 yd. per min., and, in some plants, as high as 80 yd. per min.

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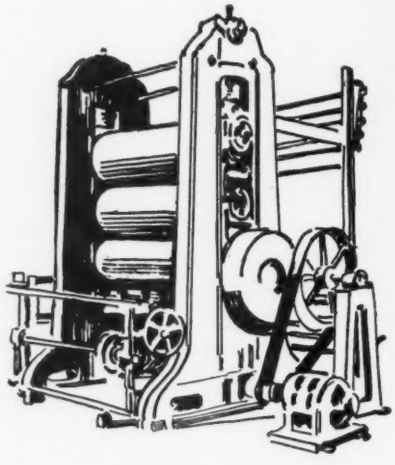
ACCURATE CONTROL of calender temperature and pressure is necessary in producing ciré finishes on acetate



fabrics. While it is possible to fuse the acetate sufficiently in one slow run, this is a dangerous procedure, and experience has shown that about two to five runs through the calender will give more satisfactory results. Just enough tension should be used on the batch roll to prevent the cloth from traveling around with the calender rolls.

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BETTER PENETRATION of vat dyes on plain-weave cotton fabrics made from highly twisted yarns has been obtained in one mill by following a rather unorthodox routine. Ordinarily, mercerizing precedes dyeing. The following procedure, in which dyeing precedes mercerizing, gave surprisingly better results. The procedure is: singe; bleach; dry; dye nearly to shade; mercerize; and return to jigs for reduction with hydrosulphite and caustic (with the addition of a small amount of dye if necessary to bring to shade), oxidation, and soaping.

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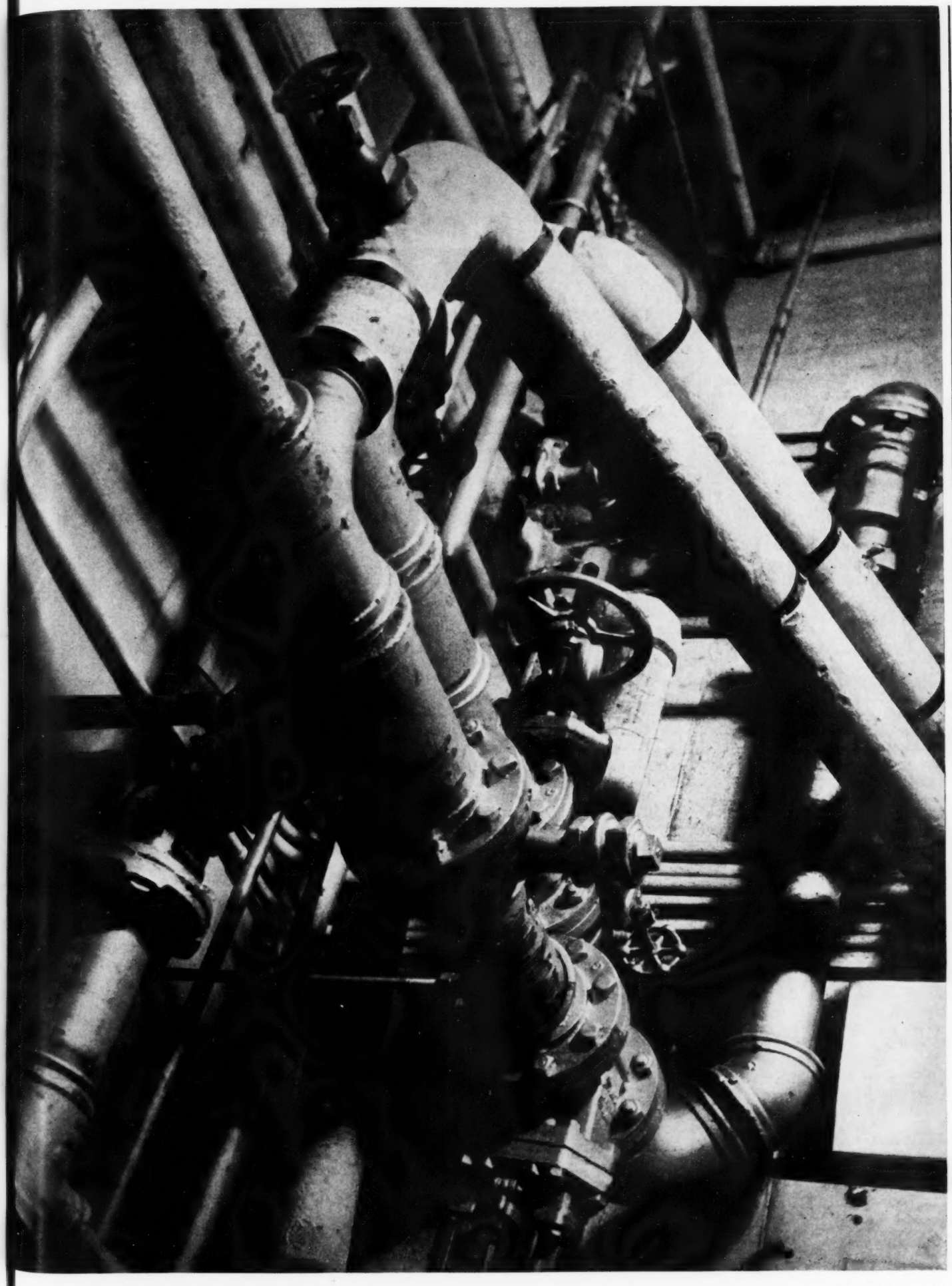
A WOOLEN MILL was suddenly afflicted with an epidemic of side-to-center shaded goods. It was finally discovered that during the summer the fan had been removed from the Heathcote upright dryer on which the goods were dried. Without a fan, all the hot air from the coils at the bottom of the dryer followed the lines of least resistance up the sides, while the center remain cool and moist. This gave fast, hot drying at the selvages; slow, cool drying in the center. The fan was replaced, and a five-months' mystery as to the cause of the shaded goods was solved.



Windowless Plants

The most radical innovation in a year of progress in mill engineering

PROSPERITY has finally come to our textile mills and, as a consequence, we find that managements are giving attention to the reconditioning of their plants. These activities include the erection of new mills; addition of new steam and power-generating equipment to furnish increased production or to improve the operating efficiencies of present units; and installation of more modern textile machinery, air-conditioning systems, and increased and better lighting facilities. Delayed recognition that much of the water used in dyeing and finishing processes, coming as it does from increasingly polluted water courses, should be further purified has resulted in a greater interest in adequate purification systems.

No Windows

In the construction of new buildings, the most radical developments of the year are the windowless mill and the mill with walls built of glass brick. Already several plants of these types are in operation, and other windowless mills are under construction in the South. Contrary to the general notion, the operative in these mills does not have the feeling that he is shut in, and the reaction has been that the employee prefers to work in such a building, rather than in one of the more usual type.

Realization has come that adequate lighting and proper air conditioning are essential in a modern plant, contributing as they do to increased production, a better quality of product, fewer seconds, and better health for the workers. In the windowless mill, these requisites are obtainable to a higher degree than in a mill with the usual windows. Glare from glass and direct sunlight is eliminated, and the artificial illumination can be more accurately distributed and better controlled. Air conditioning becomes a more simple problem, since loss of heat by radiation and conduction through glass and the leakage of air around window sashes are absent. One notable improvement is the absence of condensation on the brick walls. Where walls of glass brick are used, the amount of artificial lighting required is greatly reduced, and, as the glass can be of the type that does not allow heat rays to pass, the inside temperature on hot days is considerably less than that outside.

Top Plant

Some of our larger textile mills are learning that, because of greater steam and power demands, their power plants must be enlarged or that obsolete equipment must be replaced. For these purposes, the "top plant" or "superposed turbine" is well suited, offering the desirable features of greater efficiencies and the least possible interruption in the operation of present plants. While such installations have been in use in other major industries, they are unusual in the textile field, but already several have been installed and others are now being designed.

In brief, the principle of the "top plant" is to install one or more high-pressure boilers, operating at 400 to 650 lb. pressure, and a non-condensing turbine of suitable size to use all of the steam produced by the high-pressure boiler. This turbine will exhaust into the high-pressure mains of the existing plant. The turbine thus functions as a monster reducing valve, but in the reduction process generates a large amount of electric power with but a relatively small lowering of the total heat in the original steam. These newer types of boilers operate at high efficiencies and, as a consequence, some of the older, less-efficient boilers can be retired from service. The power produced by the turbine can be considered as a byproduct of steam generation, and the cost of a kilowatt of such power will be much less than of that produced by primary generation.

The type of boiler used for these "top plants" is known variously as "integral furnace," "steam generator," "unit boiler," etc., according to the particular make. Each unit is complete in itself with its water-cooled furnace equipped for either stoker, pulverized coal, oil, or gas fuels. Each boiler has its own pulverizers if pulverized fuel is burned, forced and induced draft fans, economizers, air preheaters, and—in many cases—its own boiler-feed pumps and feed-water heaters. Such boilers are usually operated with continuous blow-down. In the case of feed pumps and pulverizers, duplicate equipment is provided, and motor-driven auxiliaries are the rule. High superheat is desirable; if the generated pressure is 650 lb., the final steam temperature is around 750° F. In such installations, provision is usually made to pass the steam direct from the boiler through a reducing valve into the steam main of the existing plant, so that steam can be supplied if necessary to the remainder of the plant when the non-condensing turbine is not in operation. In such case, a desuperheater must be used to reduce the temperature of the steam to that of the steam in the lower-pressure lines.

With the use of high-pressure boilers, the necessity of greater attention to feed-water purification becomes marked. Silica, which is present in all boiler waters, gives little trouble with pressures under 250 lb., but above that pressure serious complications may follow if it is not removed or at least so combined as to render it harmless inside the boiler. Treatment for the removal of silica is quite complex and is being carefully studied. If there be carry-over with the steam, silica sludge is deposited on the turbine blades and is difficult to remove, as it is insoluble in water. Hard silica scale inside the boilers is also troublesome.

Speaking in general, we find that the mills are giving more attention to the filtration and purification of water both for boiler and process use. Removal of organic matter in water, which means coagulation treatment, is desirable, regardless of where the water is to be used, and is gaining in favor. Reduction of dissolved oxygen to a zero value is necessary in these high-pressure installations. This means the use of deaerators and sometimes the use also of sodium sulphite in the water to remove the last traces of dissolved oxygen. Caustic embrittlement must also be avoided, and the necessary sulphate-carbonate ratio maintained.

Energy Drive

For a long time loom manufacturers and textile engineers have sought a means of producing greater uniformity

in the power demand occurring in one revolution of a loom. At the instant that the shuttle is being thrown across, the load is at its peak and a corresponding valley occurs between the throws. If the loom is belt driven, the belt is repeatedly subjected to a high tension and then to a far lesser one; if the loom is driven by individual motor, an ammeter will show a corresponding fluctuation in current demand. Where group or the lineshaft type of drive is used, these fluctuations can be partly overcome by mounting on the lineshaft a heavy flywheel, which serves to store up energy during the low load period and to give it out during the periods of peak loads. This same principle has now been successfully developed for individual loom application in the form of the "Energy drive." A heavy flywheel pulley is mounted on the loom in place of the regular pulley or large gear. In order to utilize the device, the loom must be driven by friction or by some type of clutch. Flywheel weights are around 100 lb. or even more for wide looms. As in the steam engine, this flywheel pulley serves to give a more uniform turning motion during the entire revolution cycle, particularly at the instant when twice in each revolution the lay comes to a dead stop and reverses the direction of its motion. Advantages gained are higher possible speeds, fewer seconds, and longer belt life.

Low power factor has always been a cause of worry to textile plant engineers, and the use of capacitors to raise the power factor has been in favor. A new type of winding for polyphase squirrel-cage and wound-rotor induction motors has been devised, by the use of which in conjunction with an individual capacitor the power factor of the particular motor can be maintained at unity over a range of 25 to 125% load. A secondary winding is inserted in the slots underneath the regular winding and is connected to a capacitor. This winding has no connection with the primary circuit, but causes a condenser-reactive current to flow through the motor windings.

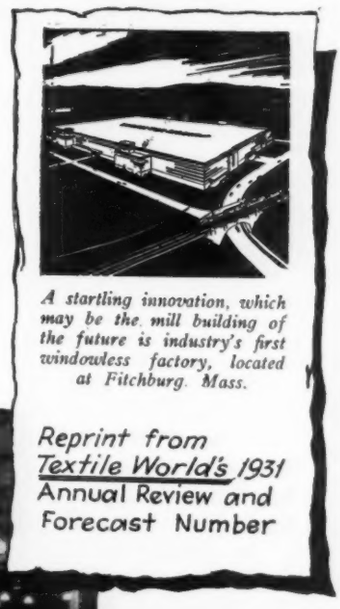
Stainless Steel

Use of stainless steels of the 18% chromium-8% nickel type in the fabrication of textile equipment has greatly increased during 1936. While in 1930 only 25 to 30 tons of stainless steel was used for this purpose, the consumption in 1936 will aggregate 1,000 tons. In the past there have been two major objections to the use of these steels—one was the difficulty in working and machining the metal, and the other was the great tendency toward corrosion of the metal adjacent to welded joints. These objections have been largely overcome by the addition to the alloy of small quantities of the rarer elements. Selenium imparts free-machining qualities to stainless steels, while titanium, molybdenum, and columbium serve to eliminate or, at least, greatly to reduce the corrosive action which has been common at a welded joint. Columbium, in particular, is effective in reducing corrosion at places where the steel has been subjected to high temperatures from any cause. A 19-9 chrome-nickel alloy has also been found to be by itself more corrosion resistant than the regular 18-8 type and is being much used for fabricating dyeing and finishing machinery.

Many stainless-steel dyekettles installed in worsted mills have the novel feature of being totally inclosed. Removal of steam which issues from boiling dyekettles has always been a troublesome problem in dyehouses, and elaborate removal systems making use of fans have been developed to accomplish this. The air removed must be replaced with fresh air from the outside, and in winter the heating of this air to prevent fogging has been a considerable item of expense. With the inclosed type of kettle, no air is removed; consequently, no replacement air is required, and there is an appreciable saving of heat thereby; also the need for an extensive vapor-removal system is eliminated. Repeated tests have shown that in addition there is a saving of 20 to 40% in the steam required for a batch, as the cooling effect of the open kettle is avoided.

Appreciation of the value of control instruments, both in the power plant and in the mill has continued to grow, and several new types of equipment have appeared. One of the more novel of these devices is a control instrument which is designed to regulate within close limits many physical conditions, such as pressure, temperature, vacuum, flow, level, speed, etc. This unit can be shifted from one application to another if desired. At least two other radically new types of control equipment which are expected to find wide application in the textile industry have passed through the development stage and will be announced early in 1937.

For several years most textile companies were not in a position to take advantage of the many improvements made in power-plant and other engineering equipment. Now they are again able to spend money for modernizing their plants. Obsolete buildings and machines are being revamped or replaced at a more rapid pace than has been possible for some time. It appears that activities along these lines will continue at an accelerated tempo during the present year. Likewise, we can anticipate further innovations and refinements in power-plant and general-mill equipment. As a net result of all these developments, textile mills in general should make good progress in 1937 along the road to more efficient and more economical operation.



A startling innovation, which may be the mill building of the future is industry's first windowless factory, located at Fitchburg, Mass.

Reprint from Textile World's 1931 Annual Review and Forecast Number

Above is an early foreshadowing of the windowless mill which has come to reality in Hudson Silk Hosiery plant (at left) in Charlotte, N. C.

PRACTICAL HELPS

for Engineers and Mechanics

HARD-FACING of machine parts with wear-resistant, non-ferrous alloys is beginning to solve maintenance problems in the textile industry. For example, a knitting mill applied cobalt-chromium-tungsten alloy to the wearing surfaces of stitches cams which cost $2.18 each and ordinarily lasted about 1 month. The worn cams were rebuilt at a cost of 30c. each for both labor and material and lasted 6 months.

•

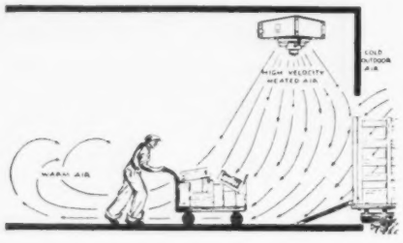
THE RIGHT AMOUNT of oil to use can often be determined by the "stopping time test." To determine whether or not a given steam engine, for instance, is properly lubricated, just pull out your watch and take the time required for the engine to come to a stop after shutting off the steam. The longer the stopping time, the better it is.

•

IN ANY PLANT where boiler losses are due to a high excess of air and an excessively high temperature, it is possible to reduce fuel consumption by at least 10% by keeping the CO_2 above 10% and the temperature of the flue gas about 100° F. higher than the temperature of the saturated steam.

•

HEATING OF COLD air which enters the entrances to mills, warehouses, shipping and receiving de-



partments, etc., can be accomplished by suspending a heater from the ceiling, just inside and directly over each door opening. The heater should be constructed to drive at high velocity a conical column of heated air directly into the cold air as it enters.

•

ANY LEAK AT THE FLANGE joint of a Van Stone or similar type of pipe carrying high-pressure steam should be examined at once. If the leak is coming from between the flanges, it is probably caused by a defective gasket and is not particularly serious, although the joint should be repacked at the first opportunity. If the steam is coming from between the loose flange and its corresponding pipe, it indicates that the pipe itself is defective, and the probable cause is a crack or break at the end of the pipe where it is flared over. Such a defect is serious, and a new length of pipe should be installed as soon as possible or a new end welded on after the defective end has been cut off.

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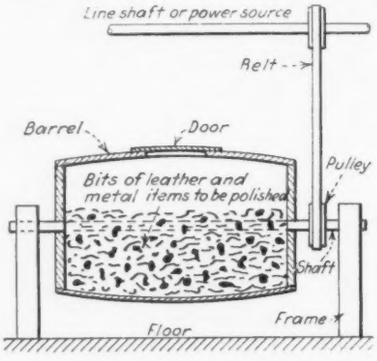
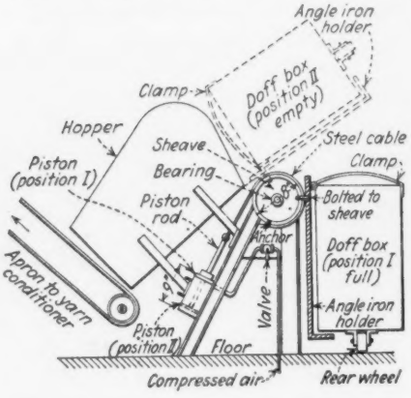
AN EASILY CONSTRUCTED polishing apparatus for flyers, drop wires, rings, and other small pieces of metal



consists of an ordinary barrel with a shaft running through the center of each head, the ends of the shaft being supported on a framework. One end of the shaft is equipped with a pulley and connected to a power source which will turn the barrel at 15 to 20 r.p.m. The barrel is about half-filled with small bits of leather. To operate, the metal items are put in, and the whole is set revolving. Usually one day is sufficient to remove all rust and to apply a high polish.

•

A DEVICE FOR EMPTYING filling from doff boxes into the hopper of yarn-conditioning machines consists essentially of two compressed-air cylinders which lift the box and empty it with a motion like an automatic phonograph changing a record. The cylinders, 4-in. diameter and 9-in. stroke, operate under 60-lb. pressure. Each piston rod is connected to a steel cable which passes over an 8-in. sheave to which it is anchored about three-quarters of the way around. A piece of angle iron, bent to fit the doff box, is bolted to the sheaves in such a manner that it is vertical,



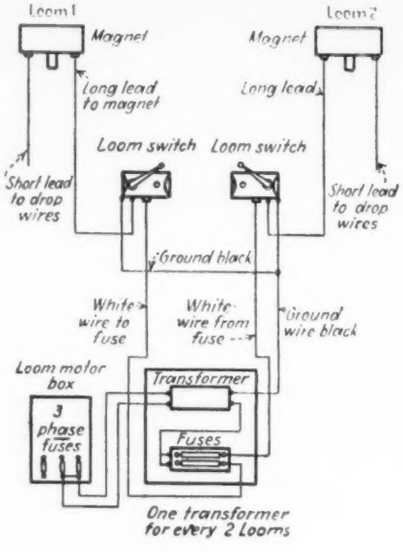
ready to receive the box, when the piston rod is extended. Two clamps hold the box during dumping. To operate, a full box is pushed into position against the angle irons, the clamps snapped over the top, and the air valve opened.

•

SOOT HAS ABOUT five times the insulating effect of asbestos of the same thickness. Hence, its prompt removal from the tubes and heating surfaces inside the boiler is essential to good operating economy. Installation of soot-blowing equipment in the average-sized plant will show a fuel saving ranging from 4 to 10%, depending on local conditions.

•

A NUMBER OF MILLS that had the old-type of generator for drop wires and feelers are changing to the newer transformer type which is connected from the motor. The accompanying sketch shows the proper method of wiring, and should enable one to install any additional transformers or to locate trouble in those which have already been installed.



These items have been culled from the 1936 issues of TEXTILE WORLD.

GOSH, BOSS... THE BOYS SURE GO FOR THIS FRIGIDAIRE-COOLED WATER!
It Pays... in good will... in profits... to
MODERNIZE WITH FRIGIDAIRE WATER-COOLING EQUIPMENT

Cool, refreshing water . . . *always* just the right temperature for health and satisfaction

● Frigidaire Water Cooling Equipment wins its place on the sound, strictly business basis of *greater efficiency, greater economy, more goodwill.*

Plenty of cool, refreshing water close at hand, and at the proper temperature—not too warm or too cold—means employee comfort and appreciation . . . more production . . . fewer accidents. And Frigidaire equipment also means a tremendous saving in actual dollars and cents over old-fashioned methods. A saving so great that Frigidaire really pays for itself in a short time, and continues to earn a big investment return for years to come.

Frigidaire equipment has the flexibility and capacity to meet every industrial requirement—completely, efficiently and economically. It will pay you to get full details and first-hand information.

For free survey and estimate, see your local Frigidaire Dealer, or write Frigidaire Division, General Motors Sales Corporation, Department 70-2, Dayton, Ohio.

FRIGIDAIRE
MADE ONLY BY GENERAL MOTORS

"ALBANY"

MACHINE CLOTHS for QUALITY PRODUCTION in SPINNING WEAVING PRINTING and FINISHING

ALBANY FELT COMPANY, Inc., Albany, New York

BLANKETS
Sanforizing
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CLOTHS
Lapping
Roller
Clearer
Slasher

JACKETS
Slasher Roll
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Rubbing

Reclaiming heat from hot spent dye liquors pays!

Attractive grounds and plant of the Golden Belt Manufacturing Co., Durham, N. C.

Whitlock Preheater installed at the Golden Belt Manufacturing Co., Durham, N. C.—covers are removed to show the Preheater units in place.

AT THE Golden Belt Mill, as at many others, the Whitlock Preheater is a profitable investment. The Preheater (see above) consists of a series of copper tubes around which hot spent dye liquor flows and through which fresh water passes on its way to the storage heater.

As a guide in estimating *your* possible savings consider this: 1000 gallons an hour of waste liquid at 140° will preheat 1000 gallons an hour of clean liquid from 40° to 120°—which means a saving of approximately 680 pounds of steam or 85 pounds of coal per hour or A TON OF COAL EVERY 24 HOURS.

In many mills Preheaters will pay for themselves in less than two years, and depreciation and maintenance costs are practically nil.

Whitlock Type K Storage Heaters have also earned the praise of many mill owners.

The nearest Whitlock Engineer will be glad to look over your entire hot water system and make recommendations based on years of practical experience in this field. Address:

The Whitlock Coil Pipe Co.

66 South Street, Elmwood, Hartford, Conn.

District Officers

New York Chicago Philadelphia Detroit Boston Cincinnati Richmond

Authorized Representatives

Atlanta Nashville Charlotte New Haven Knoxville Portland, Ore. Memphis

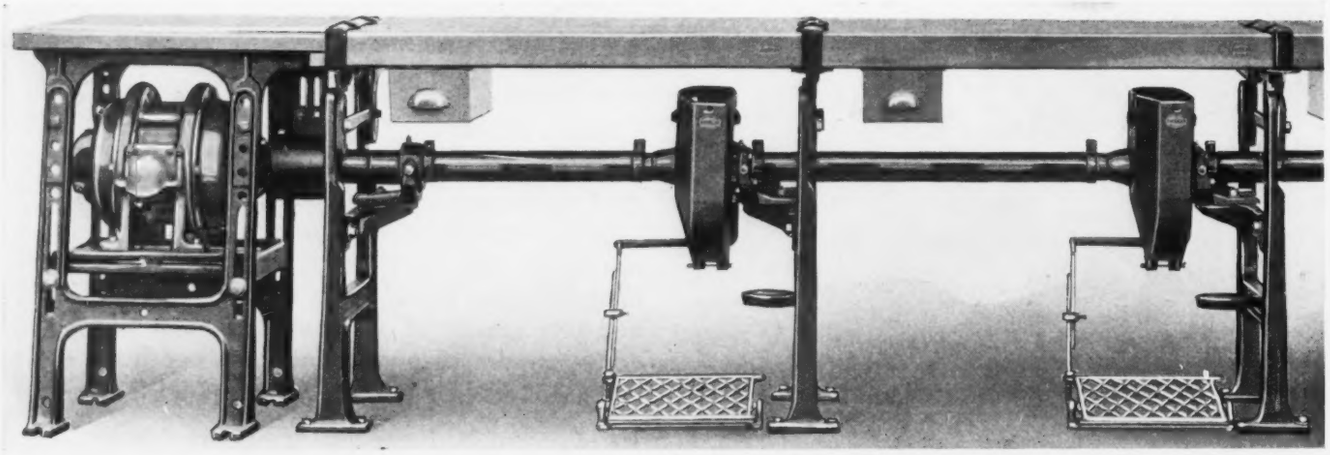
WHITLOCK PREHEATERS

TURN WASTE HEAT INTO CASH SAVINGS

Check these features against **YOUR** idea of a Power Table

- √ Direct-connected motor and drive shaft—only one belt from shaft to machine.
- √ Patented Automatic Ball-Bearing Clutch and Brake—gives positive control, quick starts and stops.
- √ All moving parts encased in steel—Safe, Clean, Economical.
- √ Scientific Lubrication throughout reduces friction to the minimum.
- √ Elimination of all belt pull from shafts saves better than 35% on power.
- √ Definite increase in production due to absence of operating fatigue.
- √ Demountable top permits any arrangement of machines.
- √ Exceptionally rugged construction eliminates vibration.

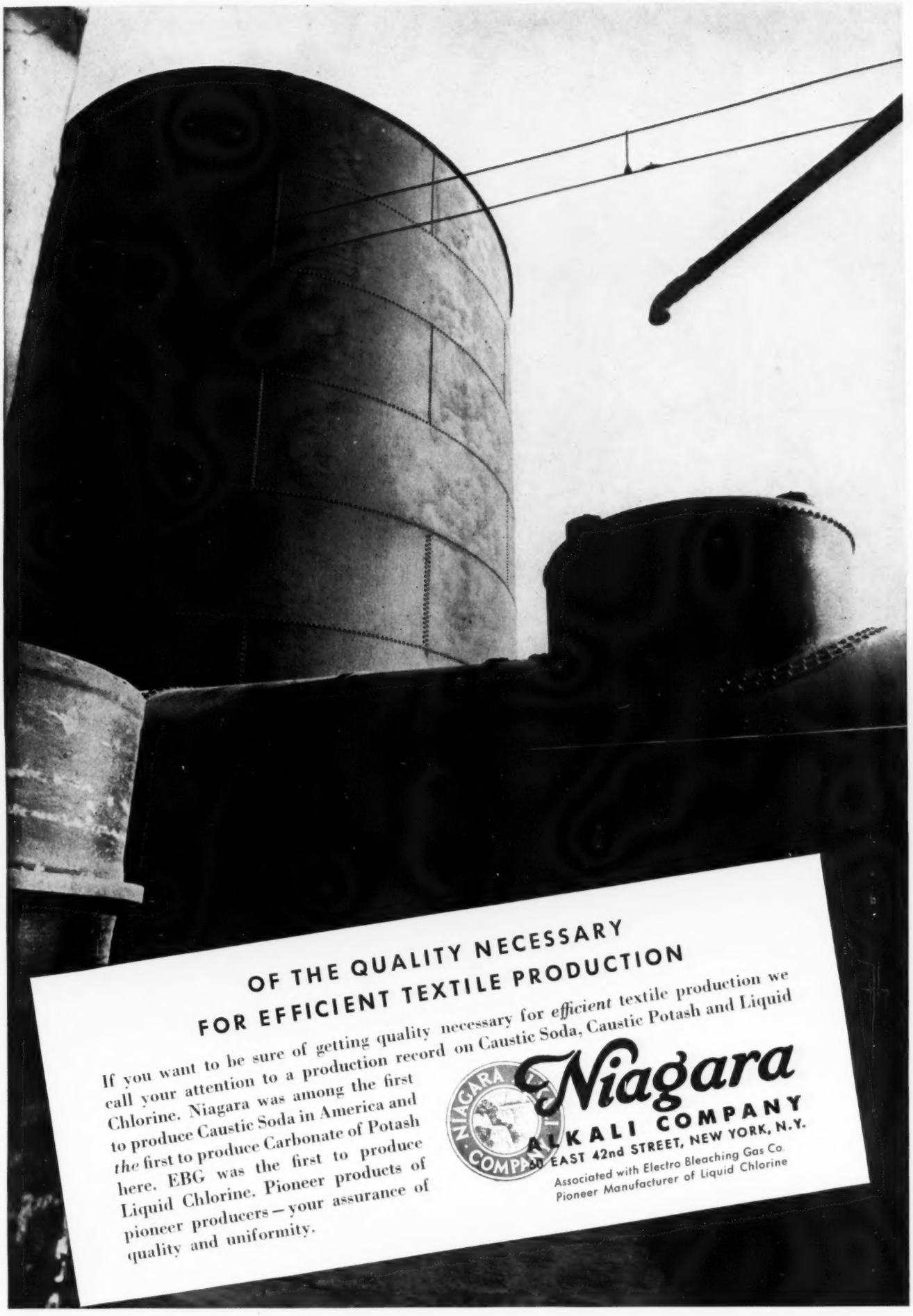
AMERICAN SAFETY TABLE COMPANY, INC.
READING, PENNA.



AMERICAN BALL-BEARING SEAMING TABLE — Especially designed for full-fashioned seaming, mock seaming, and for the seaming of cotton, burlap and canvas bags. This table is built extra heavy with 3″ edge grain front planks, thereby reducing vibration to a minimum. The length varies from 3′ 0″ to 5′ 0″; the width can be had in 16″, 18″, 24″ and 30″. The standard table generally used is 3′ 6″ x 24″. A 1 H.P. motor will operate up to six machines.

AMERICAN BALL-BEARING LOOPING TABLE — Illustrating an "American" one-half H.P. Direct-connected Speed Reducer Electric Ball-Bearing Motor driving Sixteen Dial Loopers at 300 R. P. M.

Write for particulars.



OF THE QUALITY NECESSARY FOR EFFICIENT TEXTILE PRODUCTION

If you want to be sure of getting quality necessary for *efficient* textile production we call your attention to a production record on Caustic Soda, Caustic Potash and Liquid Chlorine. Niagara was among the first to produce Caustic Soda in America and *the* first to produce Carbonate of Potash here. EBG was the first to produce Liquid Chlorine. Pioneer products of pioneer producers—your assurance of quality and uniformity.

Niagara

ALKALI COMPANY

60 EAST 42nd STREET, NEW YORK, N.Y.

Associated with Electro Bleaching Gas Co.
Pioneer Manufacturer of Liquid Chlorine

Hand-Straightening—for Added Performance Value

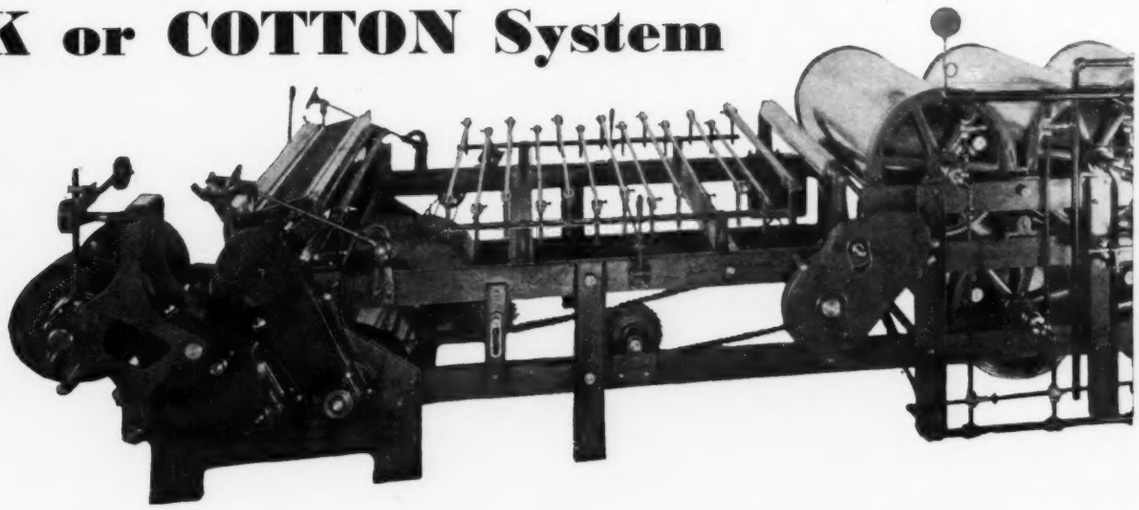
The decision of the Royersford Organization to concentrate all the facilities of its needle department on one product—the new Royersford Standard Hand-Straightened Needles—marks an important forward step in the technique of needle manufacture. Hand-straightening operations are now "standard" and not "special" jobs. You get this complete finishing at the lowest price you ever paid for anything approaching this high standard of performance.

The prescription for better knitting

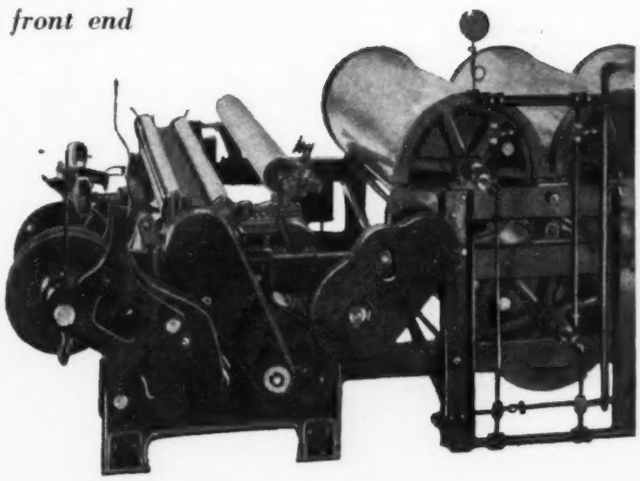
ROYERSFORD NEEDLE WORKS, INC., ROYERSFORD, PA. : : SOUTHERN OFFICE: Provident Bldg., Chattanooga, Tenn. : : Spring-Beard Needles, Narrowing Points, Picot Points Lace Points, Welt Hooks, Transfer Points, Stand Points, Bent Points, Dull Points : : Sinkers, Dividers, Jacks, K.O. Bits : : Thread Holders, Carrier Tubes, Welt Bar Hooks, and Eyelets, Strap Cleats, Plate Hooks, Footer Hooks, Strap Hooks : : R. F. Clamps and Straps, Legger Straps, Tension Wires, Snapper Springs, Mend Hooks—for all machines : : *For Glove and Underwear Industries*—Milanese, Tompkins and Tricot Needles, Milanese and Tompkins Guides, Tram Travelers : : Special orders for machine parts or appliances of any type. Development work confidential.

ROYERSFORD NEEDLES

Use This Sizer for Warps Made by Either SILK or COTTON System



Above—Sizer arranged with cotton system front end
Right—Same machine with silk system front end



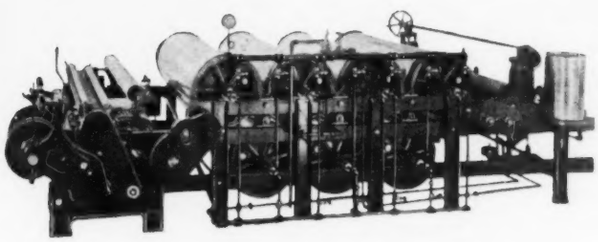
The 7 cylinder Johnson sizer is so made that by taking out or adding a small number of removable parts, the sizer may be used for either silk or cotton system sizing.

The time required for changing over is negligible.

The 7 cylinder machine is only 28″ longer than the 5 cylinder models of the corresponding silk and cotton system machine.

The added drying capacity allows for approximately 40% higher production speeds—as well as improved quality.

SEVEN CYLINDER COMBINATION SIZER



The beam is not carried by long bearing arms as on former cotton system slashers. Two heavy cast bearing frames, sliding on rigid tracks, permit the bearings to be brought up close to the end of any width loom beam. Beam receives the warp under even and continuous tension.

The position of these movable bearings can be altered during operation.

CHARLES B. JOHNSON – Paterson, New Jersey

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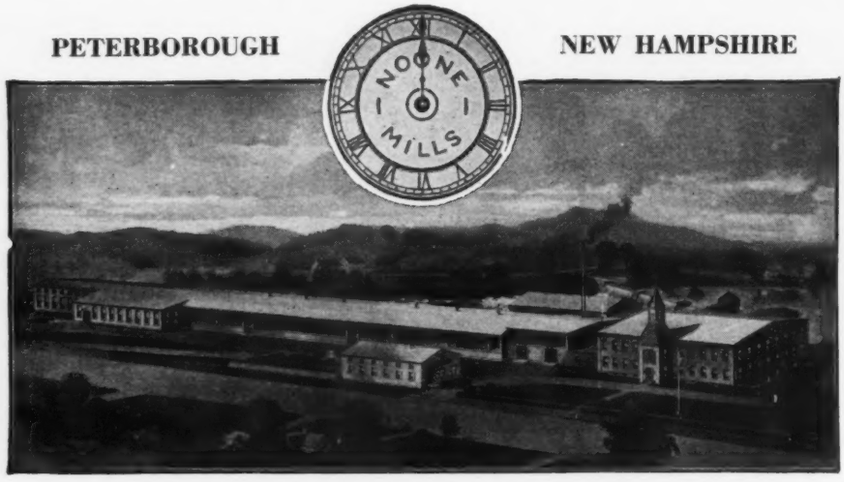
PETERBOROUGH **NEW HAMPSHIRE**



Established **1831**

Noone's Standard Roller Cloths

Insist on Noone's Standard Roller Cloths for your Spinning Rolls. Noone's have been Standard since 1831.

Results and costs are what count most.

Use Noone's Roller Cloth and be assured of a Strong Round uniform yarn, the best obtainable. Eventual cost, less than any other covering.

Good spinning can always be obtained when Noone's Roller Cloth is used, as it is the properly built Cloth,—has the correct cushion and consistency, and uniform gauge.

Noone's is best by test.

Many materials have been used for Spinning Roll Covering in years past, but have eventually been discarded in favor of the dependable Woolen Roller Cloth and Leather.

Do not be misled, put your faith in the good Old American Products: Noone's Roller Cloth and leather. If in doubt, allow us to demonstrate the superiority of our Roller Cloth and a leather cot.

Use Noone's Roller Cloths, Noone's Slasher Cloths, Noone's Clearer Cloths.

Noone's are the Pioneers in Mechanical Cloth Manufacturing in America.

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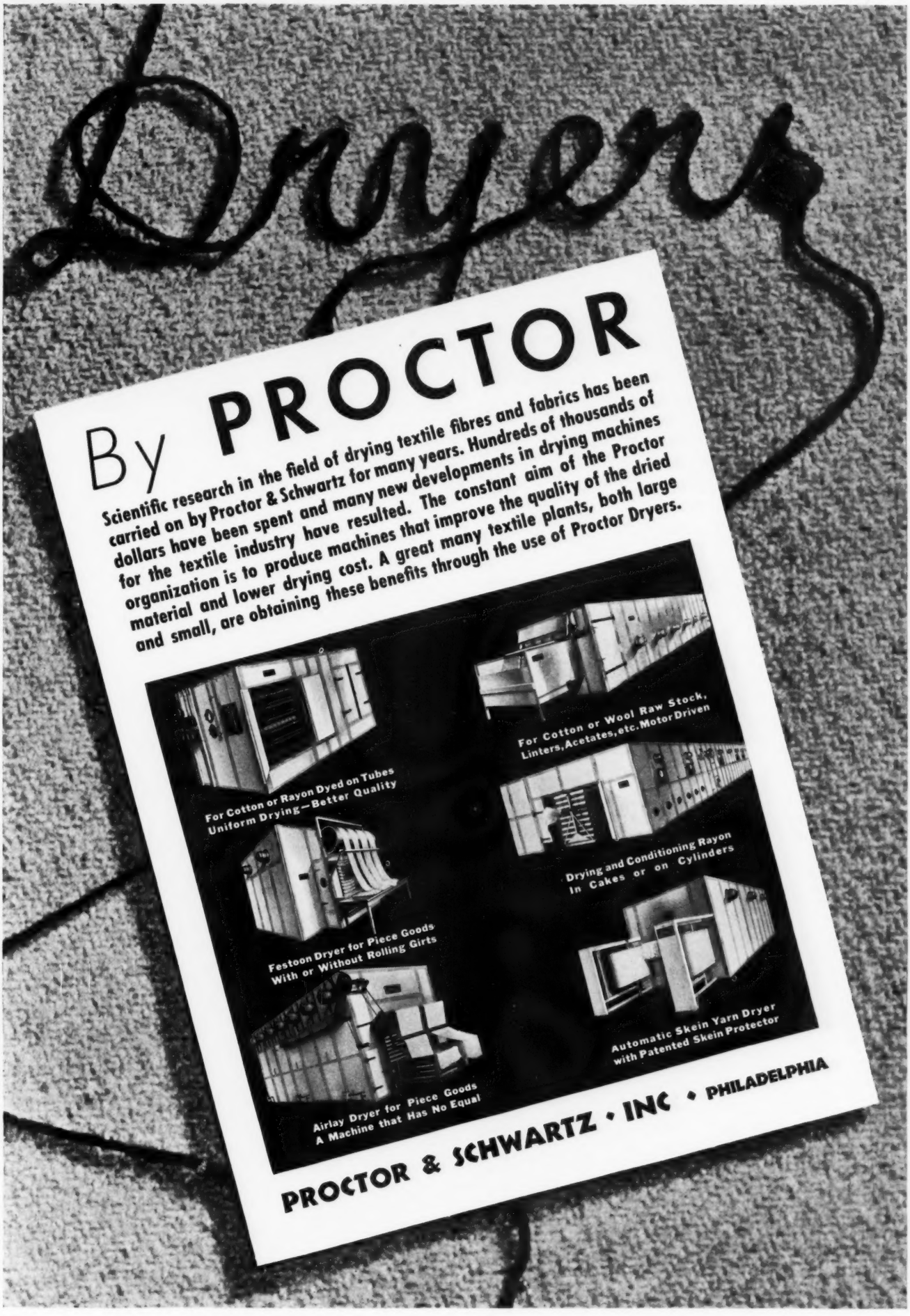
Dryers
By PROCTOR
Scientific research in the field of drying textile fibres and fabrics has been carried on by Proctor & Schwartz for many years. Hundreds of thousands of dollars have been spent and many new developments in drying machines for the textile industry have resulted. The constant aim of the Proctor organization is to produce machines that improve the quality of the dried material and lower drying cost. A great many textile plants, both large and small, are obtaining these benefits through the use of Proctor Dryers.
For Cotton or Rayon Dyed on Tubes Uniform Drying—Better Quality
For Cotton or Wool Raw Stock, Linters, Acetates, etc. Motor Driven
Festoon Dryer for Piece Goods With or Without Rolling Girts
Drying and Conditioning Rayon In Cakes or on Cylinders
Airlay Dryer for Piece Goods A Machine that Has No Equal
Automatic Skein Yarn Dryer with Patented Skein Protector
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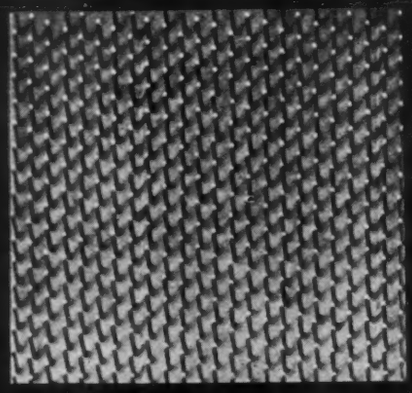

for forty-four years

Booth Quality Card Clothing

WOOLEN - - - WORSTED
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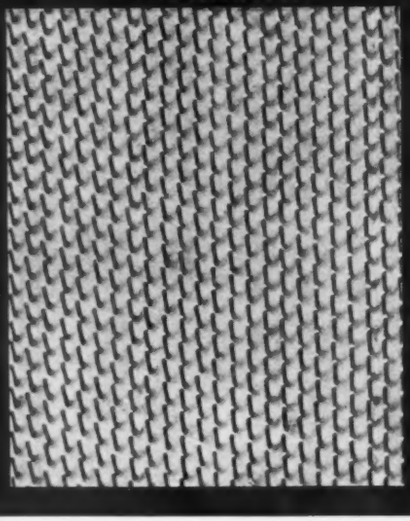


A·P·T· YARN CARRIERS *for* SPINNING TWISTING WEAVING

PHOTO BY EWING GALLOWAY

FOR WORSTED SPINNING

Any industry as old and as rich in tradition as the worsted industry is always cautious in adopting new methods. Therefore, it is particularly significant that certain worsted mills which are outstanding because of modernization programs are among those adopting A.P.T. Yarn Carriers.

A.P.T. Yarn Carriers are tapered paper tubes (with built-up paper, metal or Bakelite heads, where needed). The paper is impregnated and hardened so that it has high rigidity and high surface resistance. Because of their light weight and perfect balance, these carriers often permit increased spindle speeds and savings in power.

Other advantages are long life with full efficiency • no warping even when exposed to moisture at high temperatures • larger packages in many cases • freedom from static • no splintering, chipping, or splitting • lowest ultimate cost. Furthermore their smooth, hard, resilient surface protects delicate fibres, thus reducing loom stops and fabric seconds.

Will A.P.T. Yarn Carriers save you money? Let us help you to answer this question.

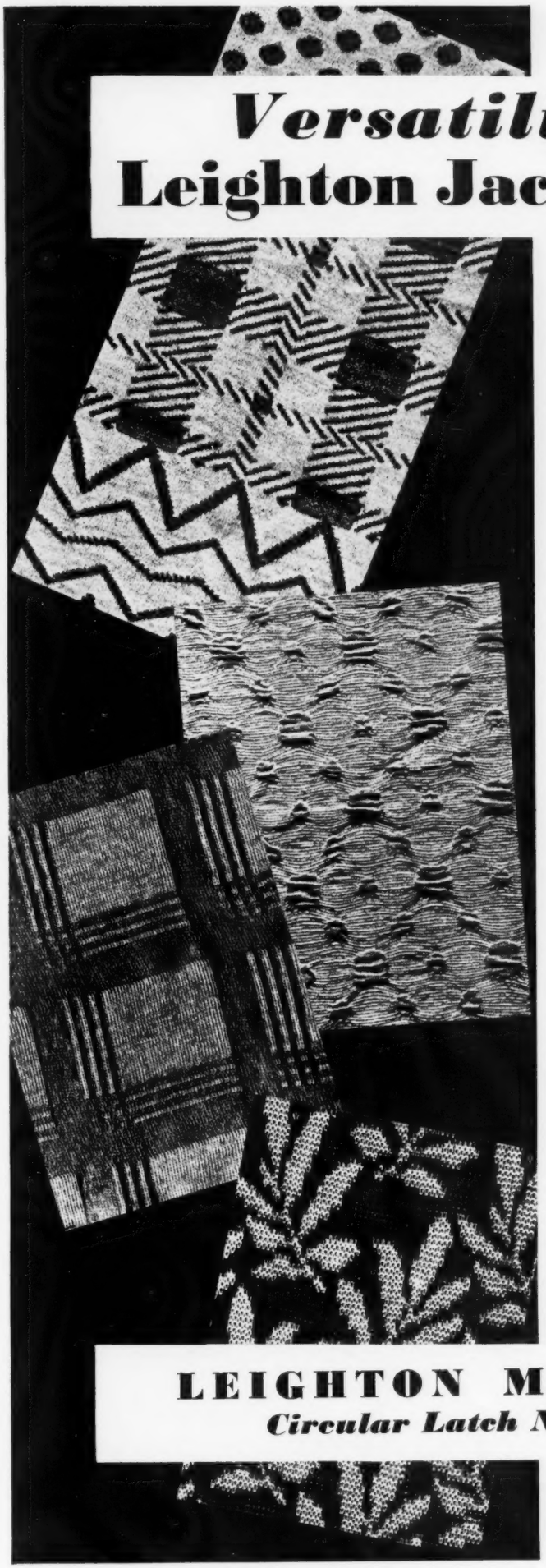
AMERICAN PAPER TUBE CO.

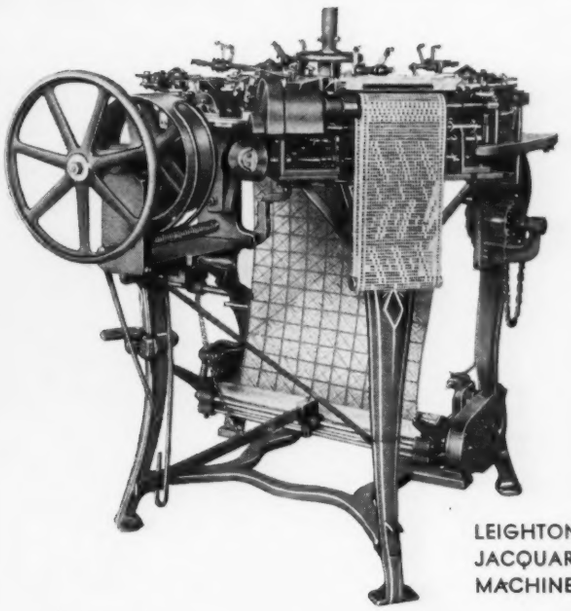
WOONSOCKET, R. I. ESTABLISHED 1898

THE FINEST TAPERED TUBES AND QUILLS

Southern Agent, ERNEST F. CULBREATH, P.O. Box 11, Charlotte, N. C.

Versatility with the Leighton Jacquard Machine





LEIGHTON JACQUARD MACHINE

WITH the Leighton Jacquard Machine, you can produce patterns of infinite variety and unlimited length. Patterns do not spiral or run on bias. *Quick pattern change.* Single card control. Multiple feeds. Patterns made inoperative by chain control. Built like all Leighton machines for smooth operation and real production. Fully protected by Lombardi patents Nos. 1737597 and 1737598.

OTHER LEIGHTON MACHINES

Transfer	*Pattern Wheel*
Three Needle Selective Rack Three Color Striper	*Stripe & Check*
	Single Stitch
	Rubber
Trim Machines 3 or 4 color For 2 & 2 Cuffs and bottoms	*Sleevers*
	Cap & Legging Machines

Special Machines Built to Order
Machines Built in All Sizes
Fine or Coarse Gauge

• ● •

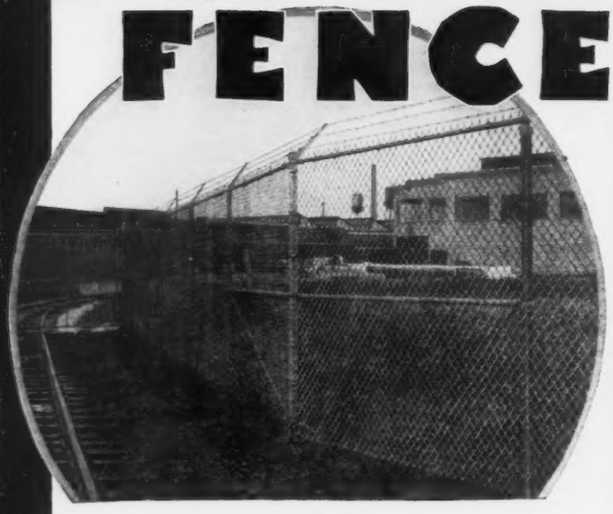
LEIGHTON MACHINE COMPANY

Circular Latch Needle Knitting Machines

ESTABLISHED 1873 — INCORPORATED 1894

MANCHESTER • NEW HAMPSHIRE

PAGE FENCE



9 REASONS for making PAGE your choice

PAGE has pioneered in woven metal property protection for 54 years. So many superior fence features have been developed by PAGE that every firm or individual contemplating a fencing installation is invited to obtain complete PAGE FENCE facts. Note these 9 briefs and mail coupon for free information booklet.

1. PAGE originated woven wire fence in 1883.
2. Exclusive PAGE "flat-weave" allows tighter stretching; lessens side-sway, wear and corrosion at contact points.
3. The only fence made in 5 superior metals to meet different destructive air conditions—Page P-12 guaranteed Copper-bearing Steel—Page-Armco Ingot Iron—Page-Alcoa Aluminum—Page-Allegheny Stainless Steel—Page genuine Wrought Iron.
4. The P-12 Wing-channel Line Post is exclusive to PAGE—the only metal post designed exclusively for fence use.
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ONLY WESTINGHOUSE GIVES YOU THIS DOUBLE PROTECTION . . . HERMETICALLY-SEALED WITH 5-YEAR WARRANTY

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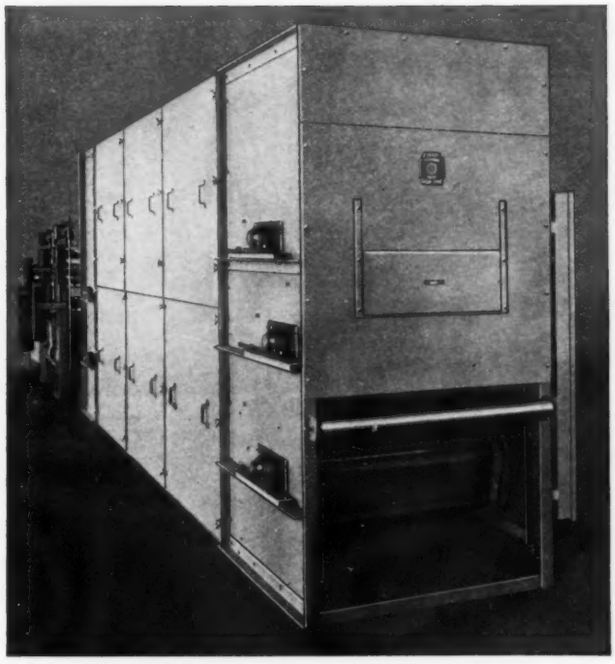

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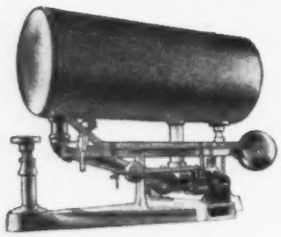

Provides quick, thorough drainage of all types of steam-heated apparatus . . . completely automatic return of all condensate to boilers at original high temperatures. Lowers maintenance cost, speeds production . . . assures important savings in steam and fuel.

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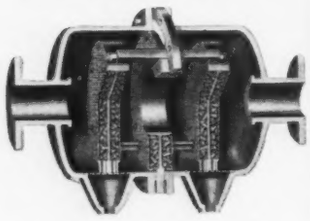

Combines *all* steam-cleansing principles in a compact unit, assuring *complete* purification. Delivers clean, dry exhaust steam that may be safely substituted for live steam in heating, drying, cooking and processing at a sharp reduction in fuel costs.

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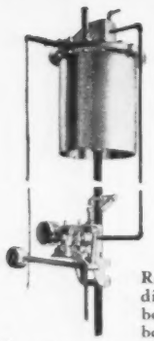

Remarkable new direct pressure boiler feeder for boilers up to 10 h.p.—operates on boiler pressure steam up to 125 pounds. Remote Control keeps valve mechanism easily accessible. Easy to install . . . no maintenance expense.

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Automatically provides make-up water for power boilers . . . requires no attention. Simple design and rugged construction assure trouble-free service. Prevents flooding or scorching of boilers. The last word in convenience.

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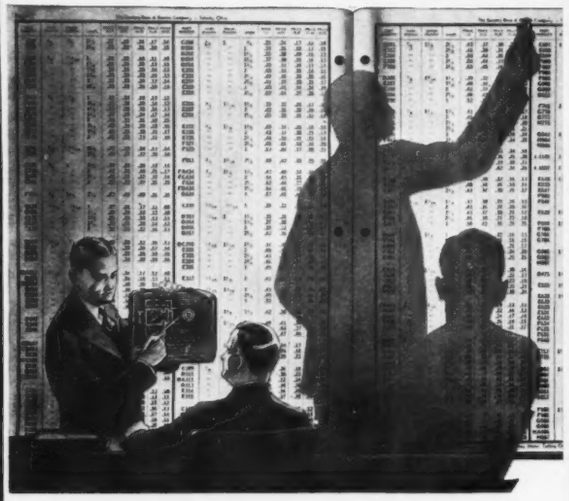

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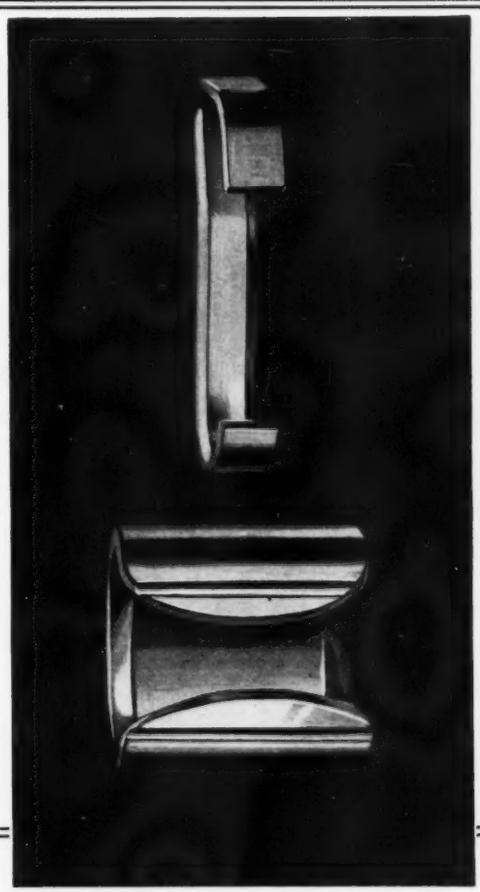

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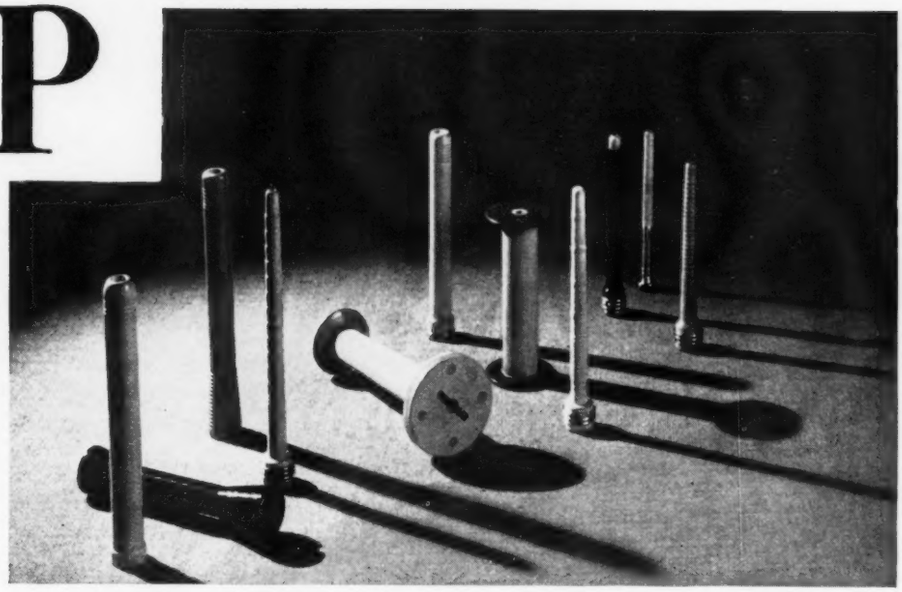

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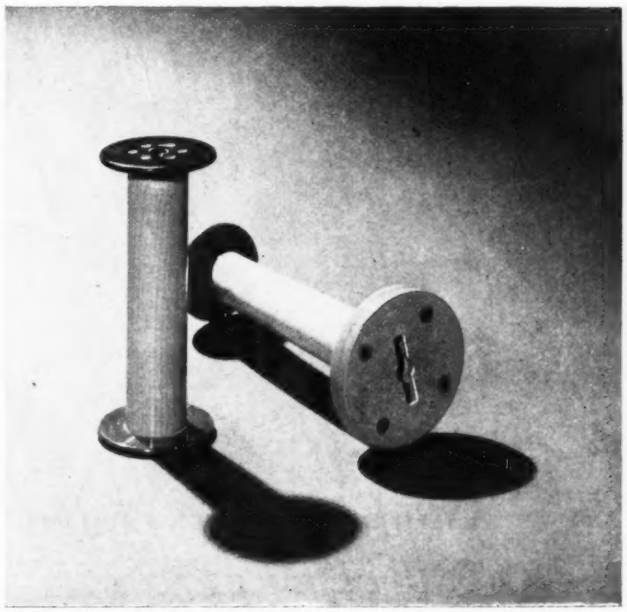
Constructed for long wear, characterized by heads of the very best hard vulcanized fiber which will not split, splinter or warp, but always remain smooth. The barrel is of hard rock maple, with bushings of dogwood made in all types for silk, rayon, cotton worsted and woolen.



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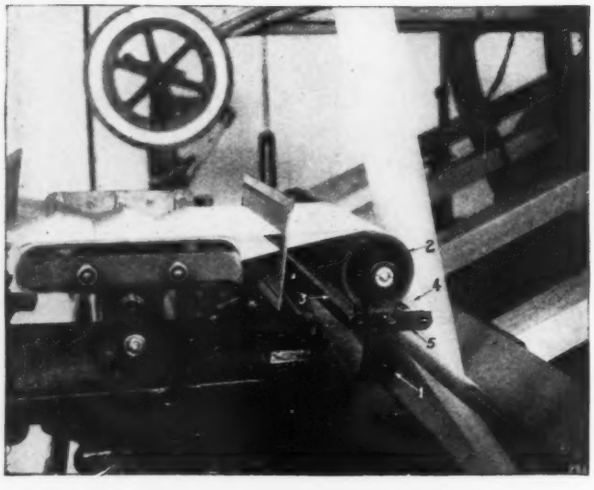

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Don't let static slow down production! Flying ends, overlapping and inaccurate spacing of sections, due to static, disappear when you install the Sipp-Eastwood static eliminator (patented). It neutralizes electric charges generated in silk or rayon during warping. Readily attached to your present equipment at reasonable cost.

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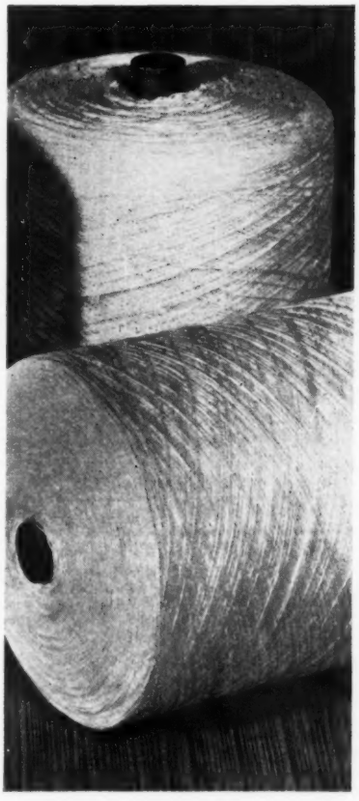

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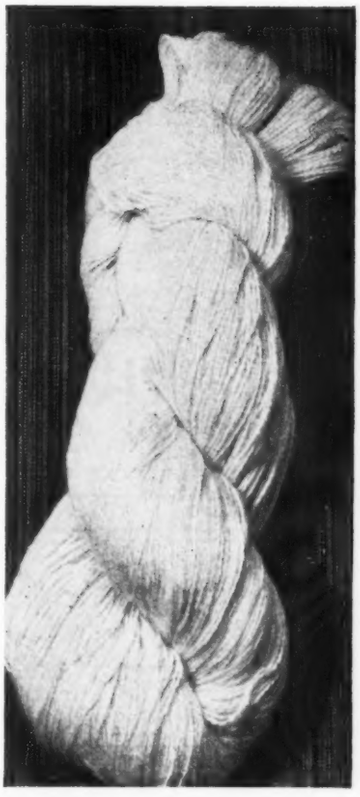
Whatever your skein, warp and package dyeing needs—



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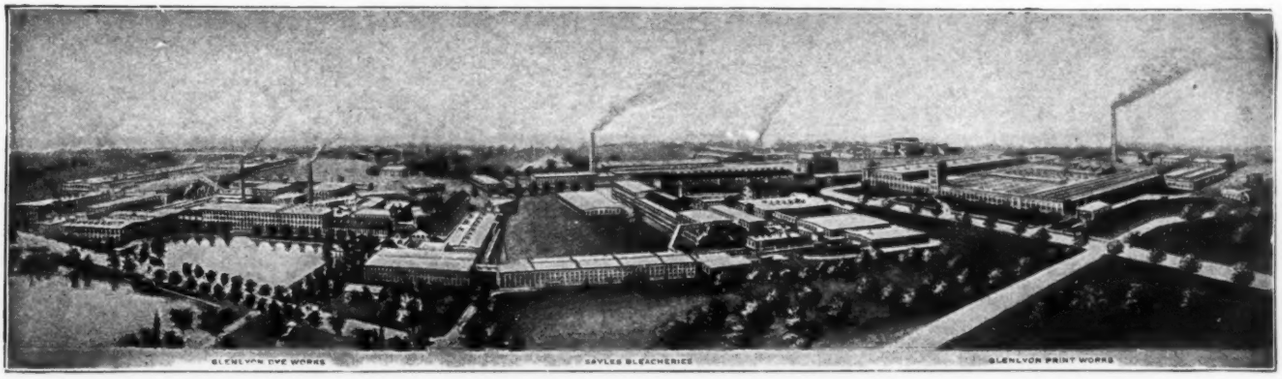

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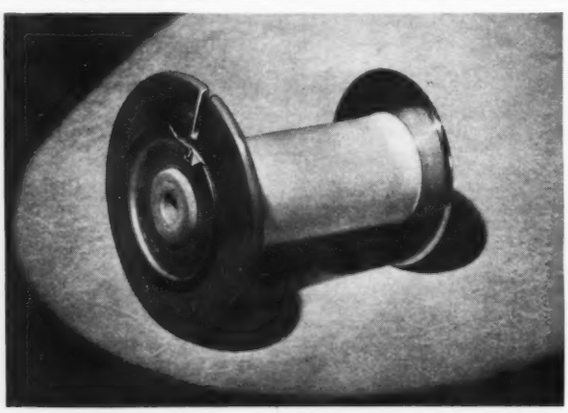

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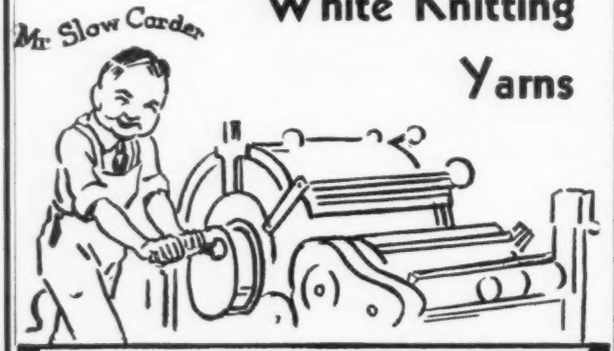

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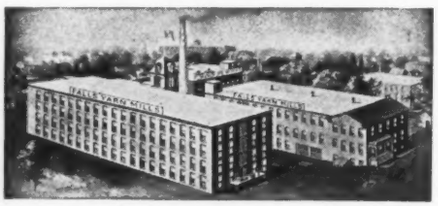

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FOR WIDE-AWAKE RETAILERS

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CHAIN STORES... co-operatives... independents —small and large—all are swinging to hosiery made of Spun-lo, the long life rayon yarn. One thing explains it... faster sales. In 1936 there was a 56% increase in sales of hosiery marked with the Spun-lo transfer.

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Spun-lo

RAYON YARN MAKES BETTER STOCKINGS

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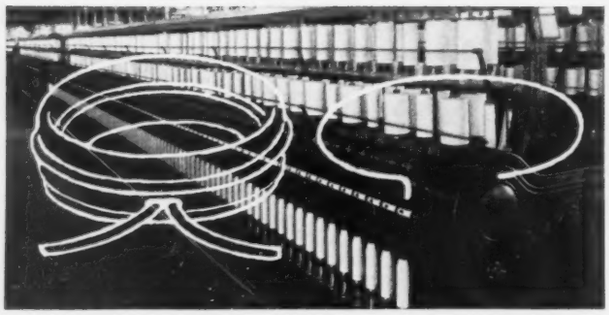

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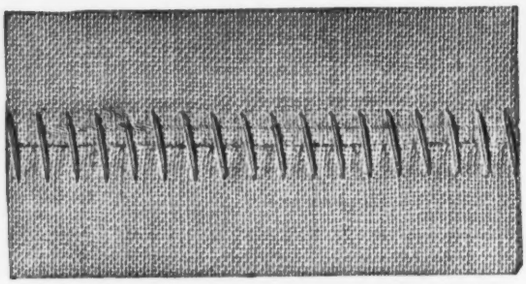
producing a butted seam to facilitate processing of textiles.

HIGH SPEED MACHINES
For Trimming and Overseaming, Hemming and Overedging



Butted Seam Produced on Merrow Style 60ABB Machine

Also PLAIN CROCHET and SHELL STITCH MACHINES for Use in the Fabrication of Knitted and Woven Goods of All Kinds

—200 VARIETIES FOR 200 PURPOSES—

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CONFIRMED QUALITY PRODUCTION
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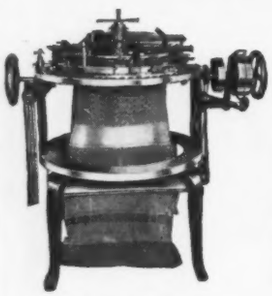

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For Cylinder, Full Fashioned, Warp and Rib Knitting Frames, also Narrowing, Stand, Transfer Points, and Welt Hooks for Full Fashioned Machines; Slides, Sinkers, Jacks, Guides or Flat Eyes, Sley and Milanese Points, Transfer Points or Quills, etc.

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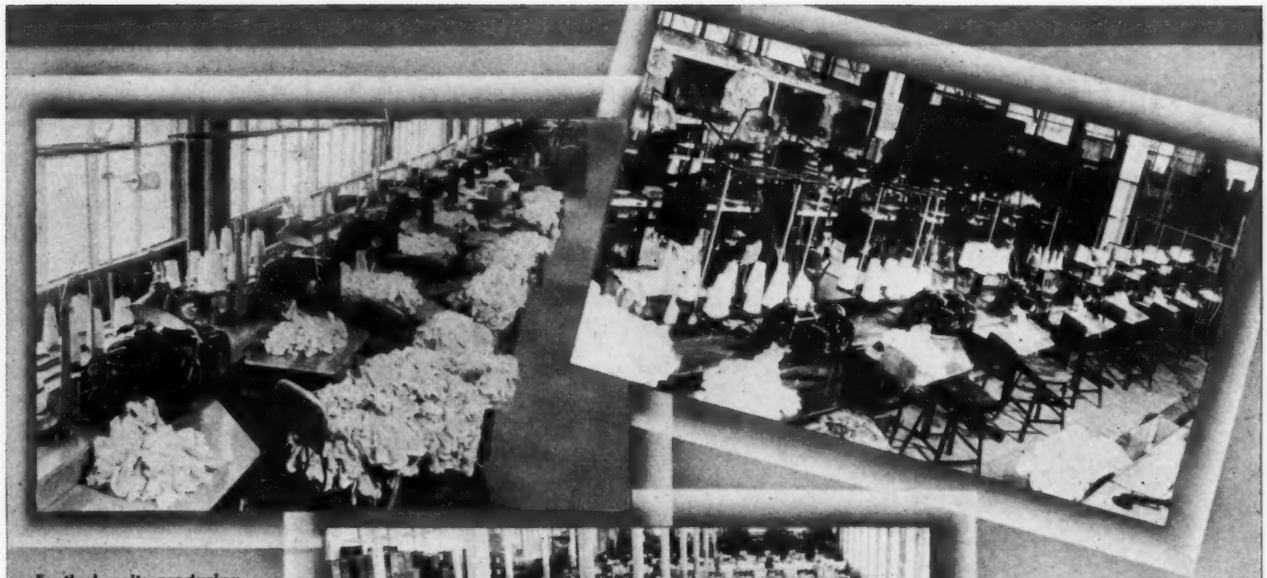
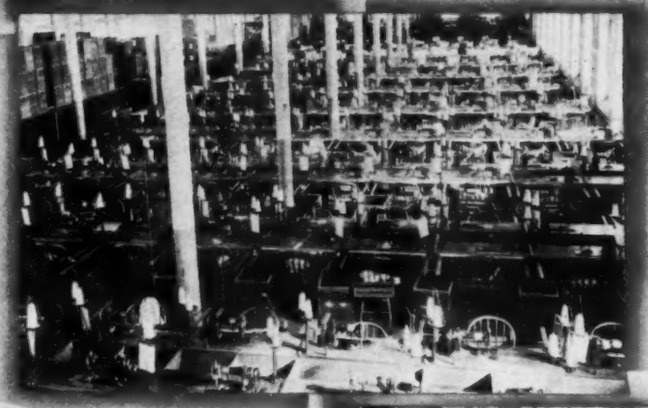


Fastlock units producing knee length hosiery.

Fastlock units in leading knee length hosiery mill.



A typical Willcox & Gibbs Lockstitch machine installation.

Feldlock machines in broadcloth and silk pajama production.

Feldlock set up producing flannelet pajamas.

The preponderance of Willcox & Gibbs machines in representative plants is a marked token of Willcox & Gibbs supremacy. The views are of work rooms in plants of leading manufacturers of knee length hosiery, ladies underwear, flannelet, broadcloth and silk pajamas. May we have an opportunity of demonstrating how Willcox & Gibbs machines can serve you equally well.

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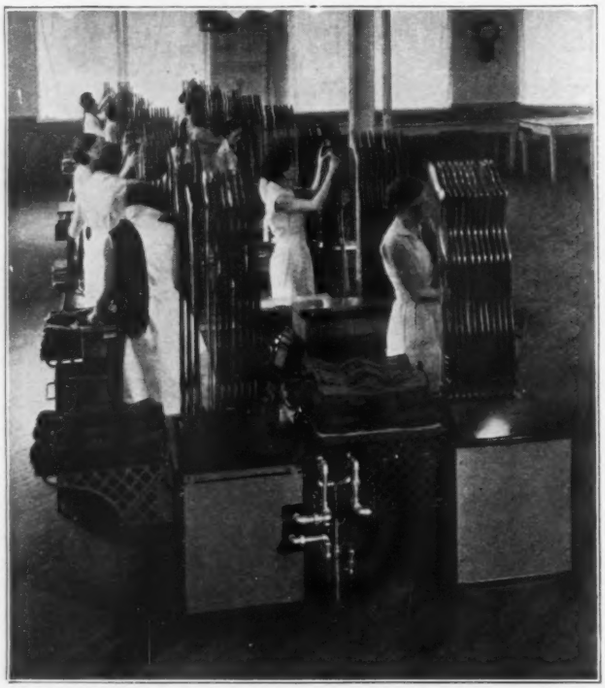
1000 DOZENS DAILY

HOSIERY FINISHING



A PRODUCTION in excess of 1,000 dozens full fashioned ladies' hosiery is being finished daily on the 13 PARAMOUNT DUAL HEAT MACHINES operated in this mill during one eight-hour shift—and the character and quality of the work is incomparable since the PATENTED DUAL HEAT principle of drying is positive protection against "baking" delicate silk fabrics. Not only does the PARAMOUNT DUAL HEAT MACHINE contribute outstanding features of production and quality, but it represents—

1. Less investment per dozen
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7. Simplicity and durability of construction

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Single fleece	Double fleece

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KNITTING MACHINERY

Latch Needles
for **HOSIERY**
UNDERWEAR
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for **CIRCULAR**
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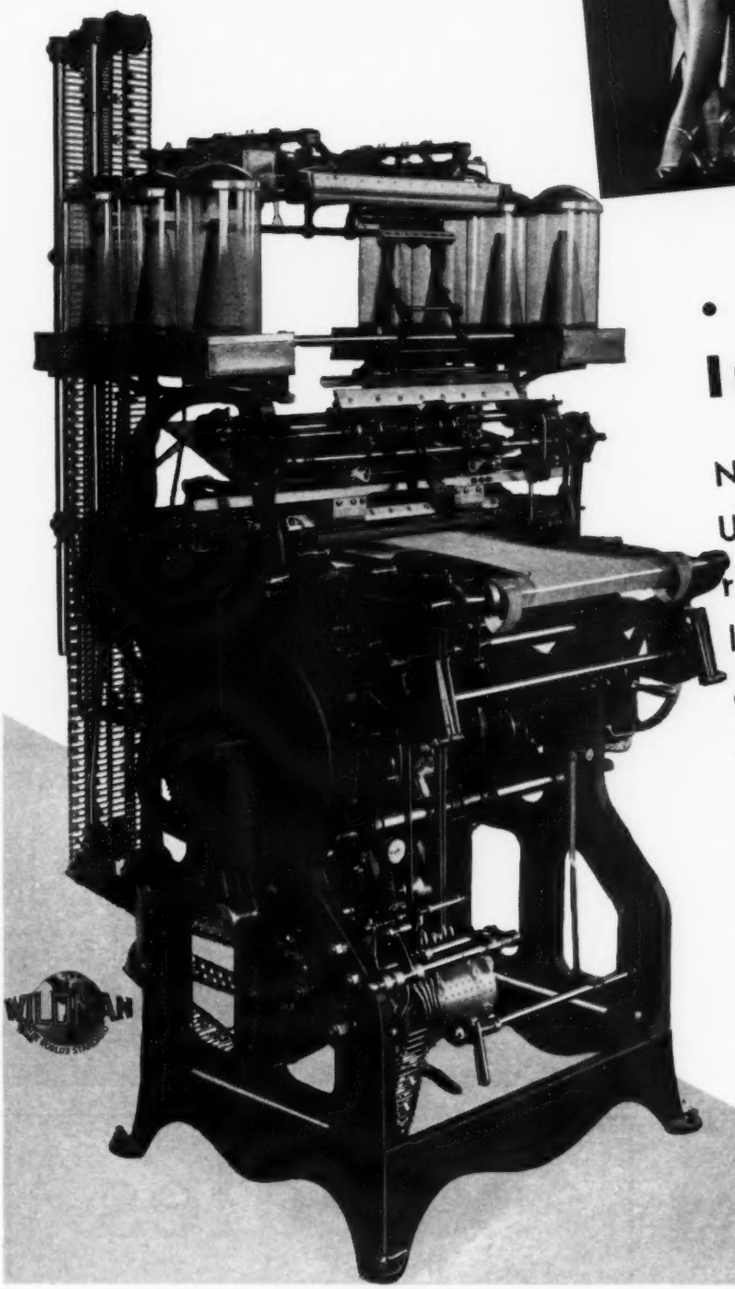

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—the seventeen positions of needles, sinkers and knockover bits—pages 81-95
—how to assemble and adjust the machine—pages 103-108
—the diagram of the cross-section assembly of the machine—page 110
—how to prevent loop distortion while narrowing—pages 138-143
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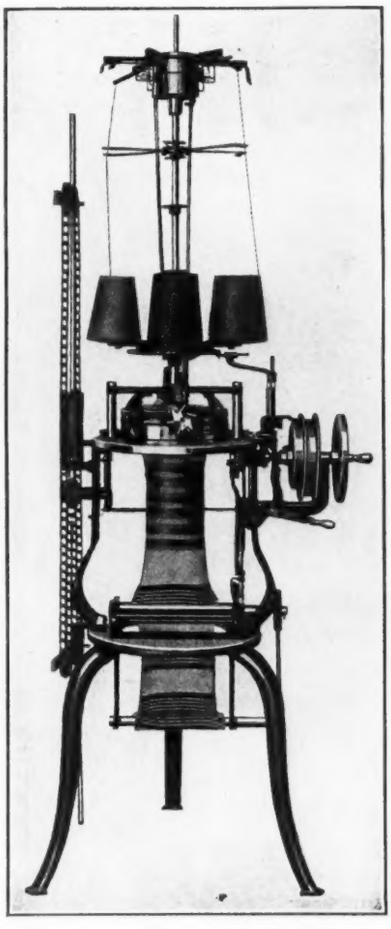

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CRANE features are the result of long experience with knitters and their problems

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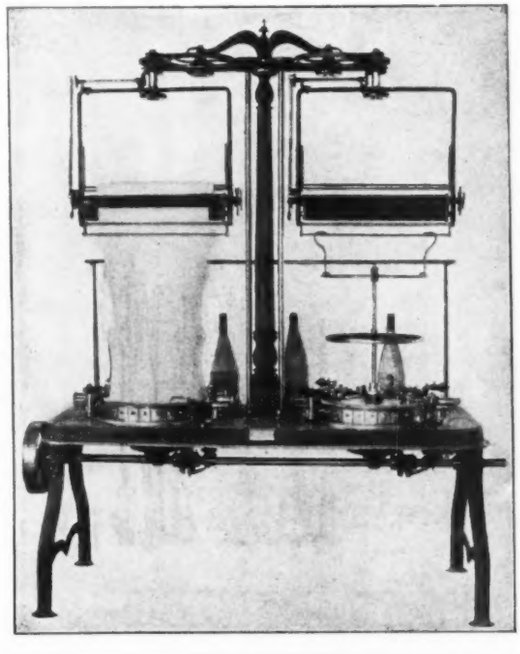

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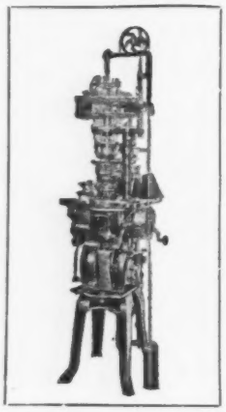

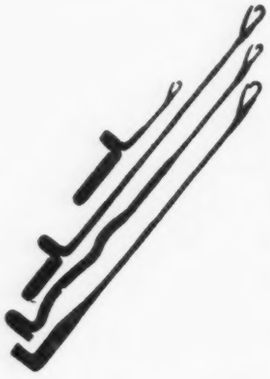

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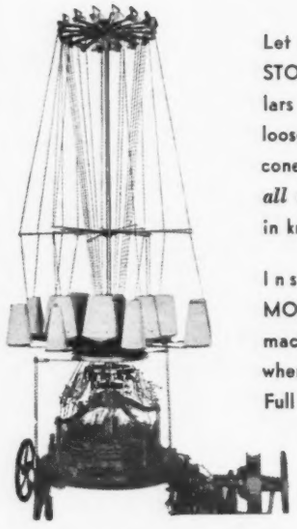
DOLLARS OF PROFIT . . .

hide in

POUNDS OF WASTE!



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Smoother
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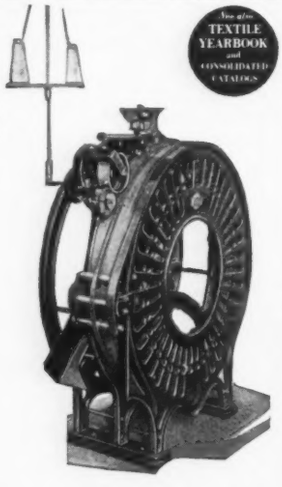

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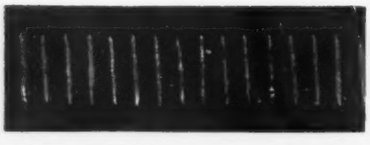

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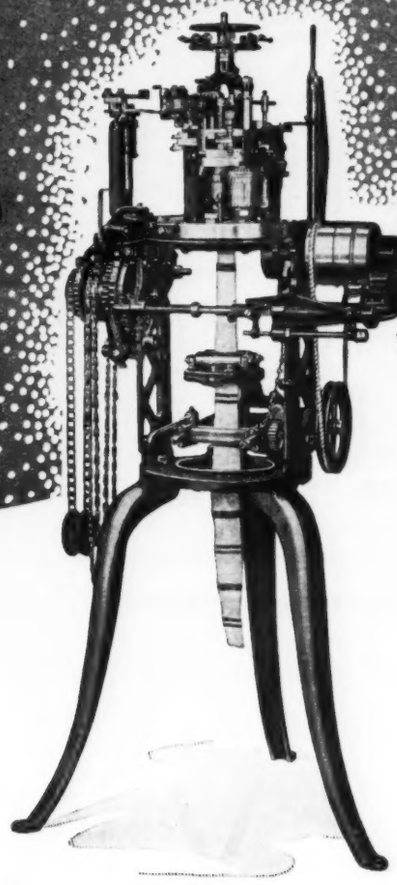

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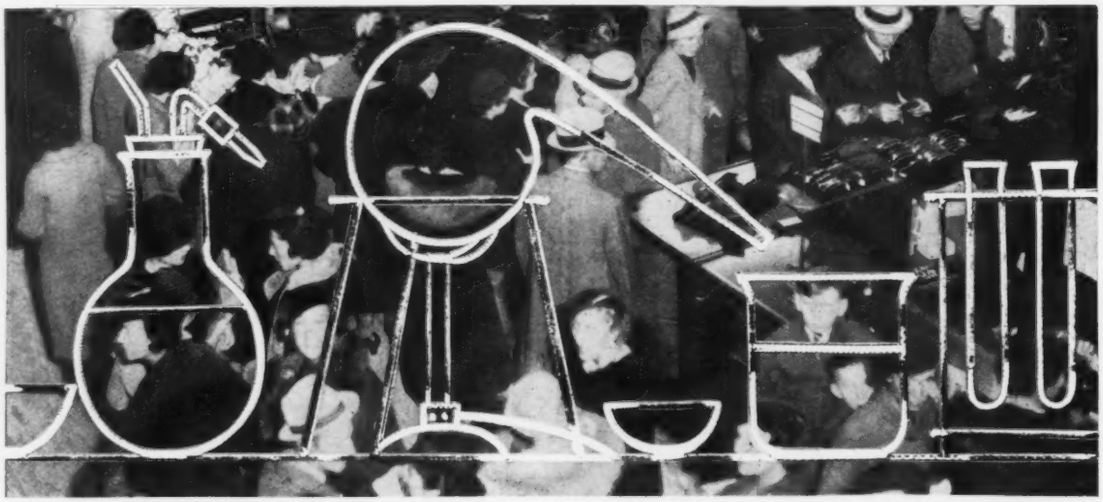

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CAUSTIC SODA

Liquid—Solid—Ground—Flake

55 years . . . and better than ever! Constantly alert, Solvay has always set the pace for scientific production of its alkalies. The most exacting of technical supervision is behind every operation of their manufacture. When you specify Solvay Caustic Sodas you are assured of a product of the highest commercial standards, full strength and uniformity.

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50% and 75% STRENGTHS

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YOU CAN SAVE 25 TO 30% ON PEROXIDE COSTS

by bleaching with

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YOU make this great saving on peroxide cost because *a dollar's worth of SOLOZONE* has the most bleaching oxygen for the money.* And as every bleacher knows, it's the bleaching oxygen in peroxide that does the bleaching. The required bleach takes so much bleaching oxygen; the less you pay for this oxygen, the more you save on the job.

Quite simple, isn't it? But it explains why SOLOZONE with 20% bleaching oxygen saves so much in the cost of peroxide. This saving is quite independent of any other economies you may be able to make in your process by using SOLOZONE. The type of cottons you are processing does not have to be considered, for whether you are processing heavy or light goods, knit goods, yarn-dyed shirtings, etc., it takes a certain amount of bleaching oxygen to give the required results. You can get these results—a high quality peroxide bleach—at the lowest cost for peroxide by using SOLOZONE.

Bleaching with SOLOZONE is *peroxide* bleaching, consequently this economical peroxide can be used for processing other textiles as well as cotton.

Write to our nearest district office for more information about SOLOZONE and its specific application for your bleaching.

Other R & H Chemicals for the textile industry include ALBONE* (Hydrogen Peroxide, 100 Vol.), for bleaching all types of fabrics; Sodium Perborate, for oxidizing vats to clear, bright colors; Non-Flammable Solvents, Liquid Chlorine, Potash Carbonate, Potash Caustic, Bichromate Soda, Bichromate Potash, Caustic Soda, Soda Ash, Oxalic Acid, Formic Acid, Sodium Silico Fluoride, Soda Acetate, Soda Nitrite, Permanganate Potash, Yellow Prussiate Potash.

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****SOLOZONE** is the registered trade-mark for du Pont Sodium Peroxide. It is a stable powder, easily soluble in water and acid; contains 20% available bleaching oxygen, the largest amount of bleaching oxygen in any commercial peroxide. At 17c per lb. (base price), SOLOZONE is the lowest-priced, highest strength peroxide available commercially.*

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District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco

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Normal and Concentrated

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Agents in U. S. A. for Dunlop Concentrated 60% Latex, product of Dunlop Plantations, Ltd.

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CHARLES T. WILSON CO., Inc.
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For All Textile Purposes

Manufactured by
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Quality « » Service

THIS PAIR NEVER LEFT THE MILL!

Rust spots and holes in silk hose caused by flocculent material in the peroxide bath.

REMEDY: PQ SILICATE OF SODA AS A COLLOID . . .

EVEN if your goods are different, you too can profit from the protective colloidal action of PQ Silicates of Soda.

In peroxide bleaching, for instance, "Star", a PQ Silicate, by retarding the release of oxygen produces clearer, cleaner whites. This specially clarified pure silicate prevents rust particles and other impurities from settling on the goods and causing holes and spots. Hypochlorite bleaching of cotton with PQ Silicate also reduces iron stains and yields better colors with less danger of strength loss.

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How can a PQ Silicate help you in your mill? Let's discuss it.

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Please send Bulletin 171, Silicates of Soda

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Latex and the Textile Industry

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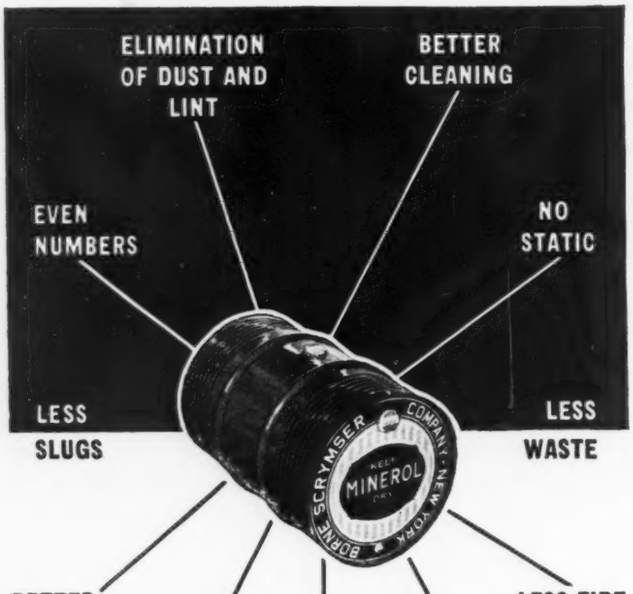

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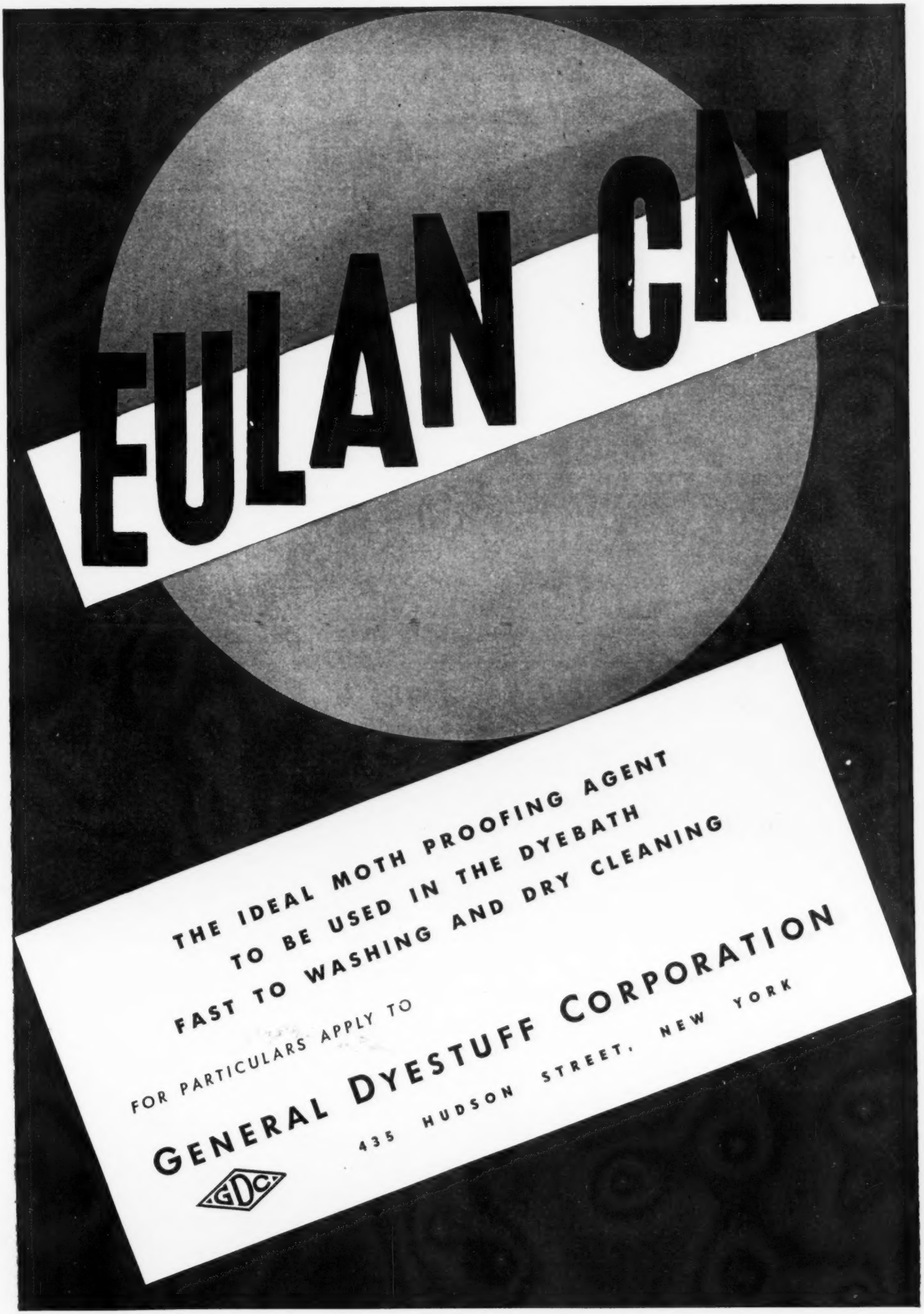
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THE IDEAL MOTH PROOFING AGENT
TO BE USED IN THE DYEBATH
FAST TO WASHING AND DRY CLEANING
FOR PARTICULARS APPLY TO
GENERAL DYESTUFF CORPORATION
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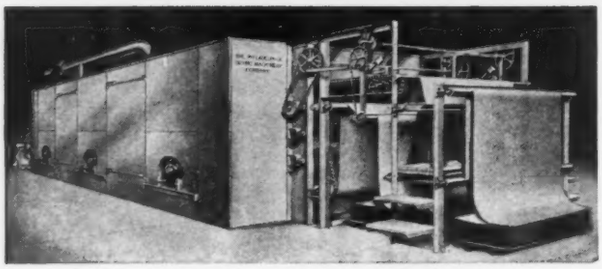

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DOES THE WORK OF 3 MACHINES . . .

← 1 MAN EQUALS 3 TO 6 MEN!

Features the New Aero-Therm Unit, which forces air THROUGH the fabric instead of across it. Assures faster, more uniform, more thorough drying. Greatly increased capacity.

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LOWERS OPERATING COSTS
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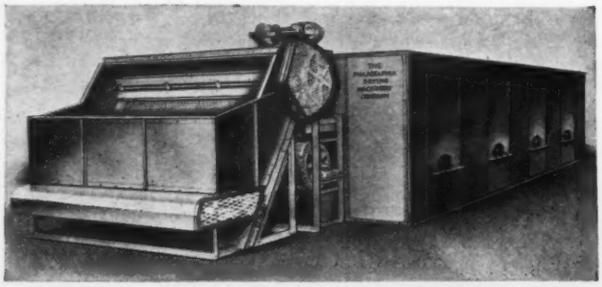
Unusual SAVINGS in power and steam consumption.



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DRYERS for ALL Textiles from Raw Stock to Finished Fabrics

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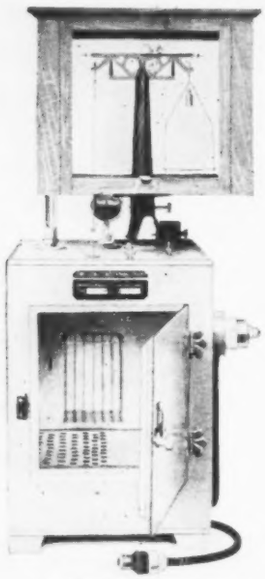
THE EMERSON OVENS OF VARIOUS TYPES ARE DESIGNED TO TEST THE DIFFERING SIZES OF SAMPLES AND VARIOUS MATERIALS ENCOUNTERED IN THE TEXTILE INDUSTRY -- WHETHER COTTON, WOOL, SILK OR RAYON



MIDGET OVEN
with one basket 4" x 4" x 6", for the small mill.

for Conditioning Oven Information

Write to

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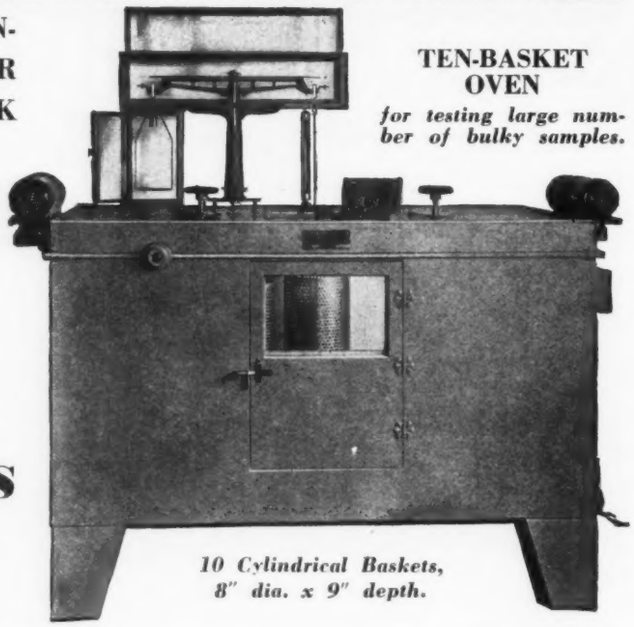
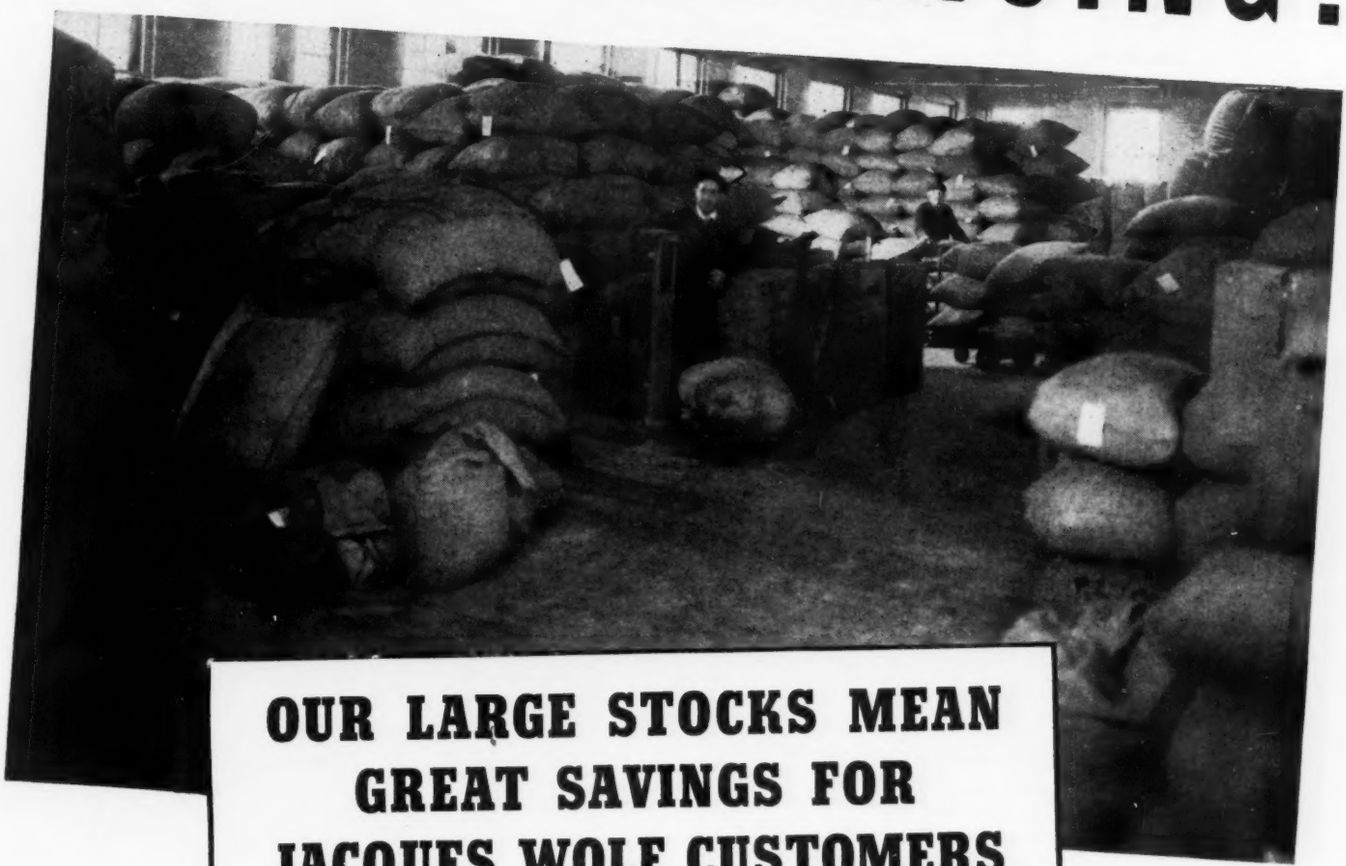
TEN-BASKET OVEN
for testing large number of bulky samples.



10 Cylindrical Baskets, 8" dia. x 9" depth.

TRAGACANTH PRICES ADVANCING!



Corner view of our warehouse showing part of our large stocks of Gums.

OUR LARGE STOCKS MEAN GREAT SAVINGS FOR JACQUES WOLF CUSTOMERS

• The Gum Tragacanth crop is below normal this year and prices are steadily advancing. Our stocks are extensive, both Aleppo and Persian, and we can supply—

WHOLE GUM, CRUSHED, GRANULATED, POWDERED

Since the most desirable gums are from the early pickings, anticipate your needs now and send us your order while stocks are complete. Immediate or future delivery.

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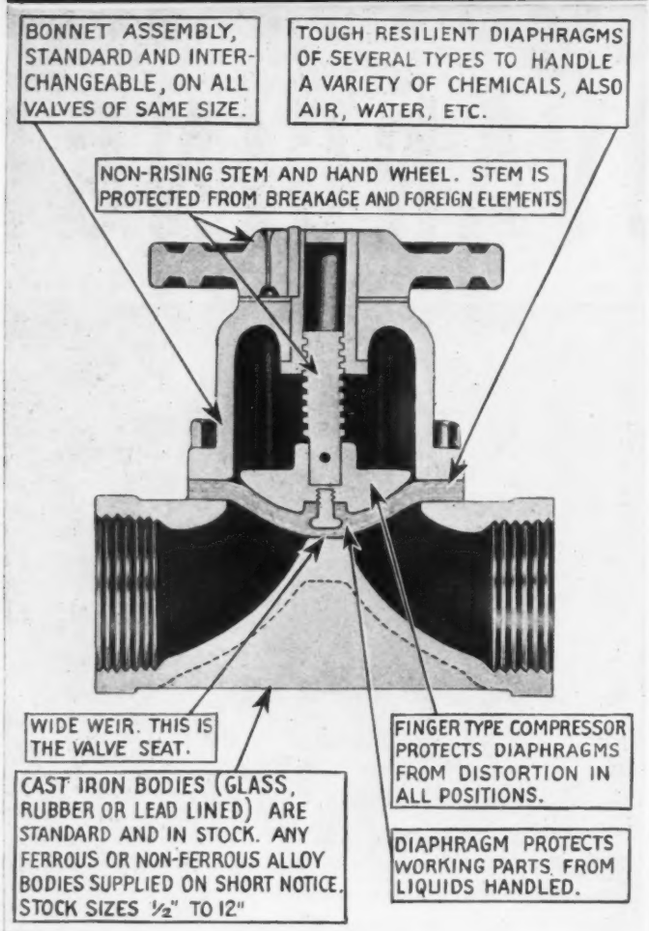
The Valve that is creating so much interest in the TEXTILE FIELD


BONNET ASSEMBLY, STANDARD AND INTERCHANGEABLE, ON ALL VALVES OF SAME SIZE.
TOUGH RESILIENT DIAPHRAGMS OF SEVERAL TYPES TO HANDLE A VARIETY OF CHEMICALS, ALSO AIR, WATER, ETC.
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WIDE WEIR. THIS IS THE VALVE SEAT.
CAST IRON BODIES (GLASS, RUBBER OR LEAD LINED) ARE STANDARD AND IN STOCK. ANY FERROUS OR NON-FERROUS ALLOY BODIES SUPPLIED ON SHORT NOTICE. STOCK SIZES ½" TO 12"
FINGER TYPE COMPRESSOR PROTECTS DIAPHRAGMS FROM DISTORTION IN ALL POSITIONS.
DIAPHRAGM PROTECTS WORKING PARTS FROM LIQUIDS HANDLED.

Hills-McCanna Saunders' Patent Valves are creating unusual interest in the Textile Field because they do not clog, leak, break or corrode, and have low first cost and maintenance. These Valves are used for handling Acids, Alkalis, Dyes, Liquors, Viscous and Gritty Solutions, Hot or Cold Water, Compressed Air, etc.

Available in sizes from ½ to 12 inches. Bodies made from a variety of alloys; also cast iron, lined with lead, glass or rubber.

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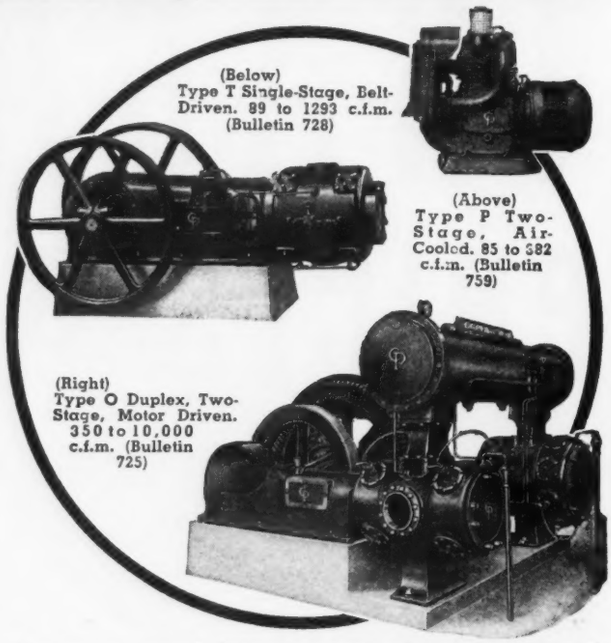
Valves

AIR COMPRESSORS


(Below) Type T Single-Stage, Belt-Driven. 89 to 1293 c.f.m. (Bulletin 728)
(Above) Type P Two-Stage, Air-Cooled. 85 to 582 c.f.m. (Bulletin 759)
(Right) Type O Duplex, Two-Stage, Motor Driven. 350 to 10,000 c.f.m. (Bulletin 725)

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CHICAGO PNEUMATIC

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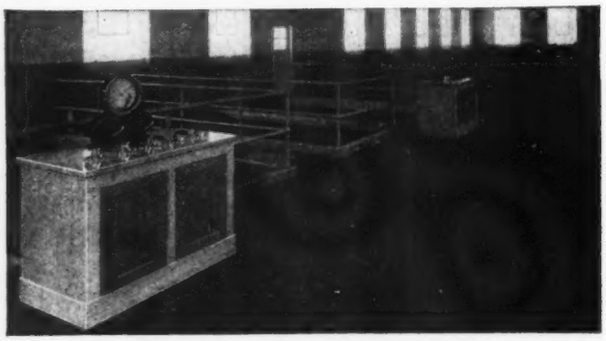
Roberts Filters



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We specialize in furnishing and, where desired, installing the full complement of equipment in Water Filtration Plants. We manufacture a full line of Pressure Filters, Zeolite Water Softeners, and Water Conditioners for feeding Phosphates, Silicate of Soda, etc.

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—is the modern answer to

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BRIGHTER SHADES
MORE LEVEL COLOR

LET US ALSO QUOTE YOU ON

Acetic Acid
Acetate of Soda
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Epsom Salts
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Lactic Acid
Muriatic Acid
Nitric Acid
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Tri-Sodium Phosphate

GRASSELLI FORMIC ACID, added to the dyebath, produces colors that are brighter and more brilliant in shade, without streaks or clouds and perfectly level, even in cross dyeing.

Textile manufacturers will find that *Grasselli Formic Acid*, 85% and 90%, is always uniform in quality—always crystal clear—never darkening when exposed to light. It is both an acid and an aldehyde, therefore, it produces results not obtainable in other acids.

It will not tender the most delicate fabrics, yet has the efficient strength to almost completely exhaust the dyebath.

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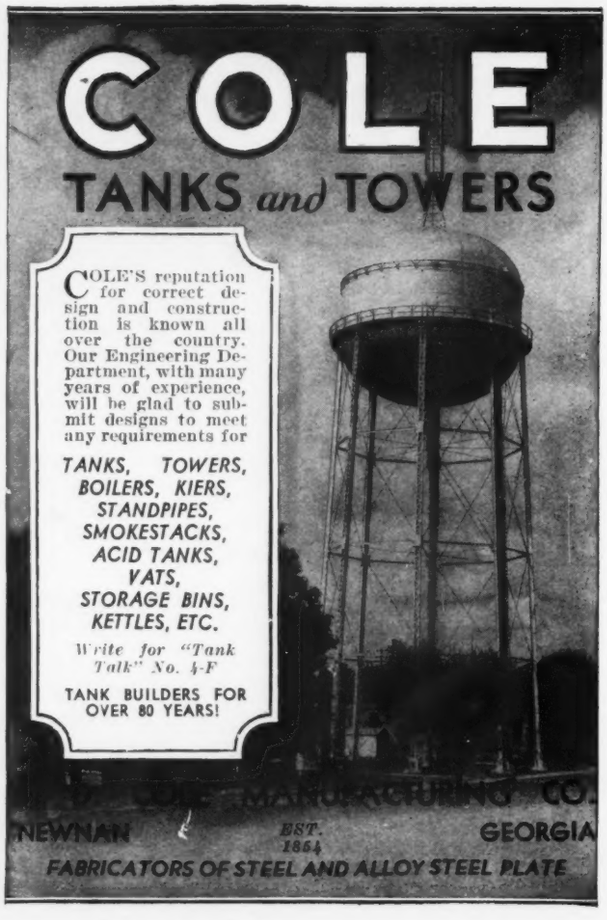
SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS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TANK BUILDERS FOR OVER 80 YEARS!
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Two Refined Airfloated Clays
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Exceptionally smooth inerts, very free from grit—Residue on 325 mesh 0.3%—Both mix readily with starches, tallows and gums. Shipped in heavy paper bags.

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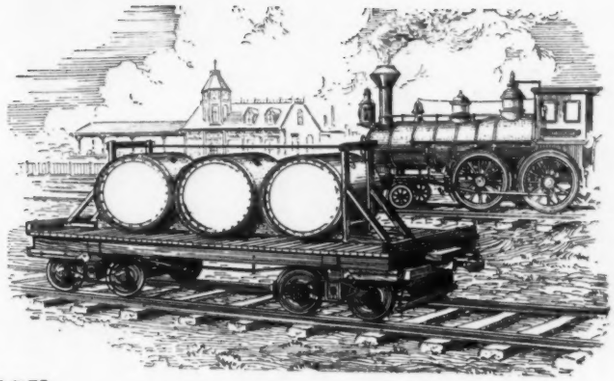

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Productimeter Pick Counters have met the test of use on many thousands of looms since the silk mills came to us 17 years ago for a dependable means of measuring loom production. Their built-in ruggedness keeps them running true through years of exposure to humidity and loom vibration. Send for folder on Textile Productimeters.

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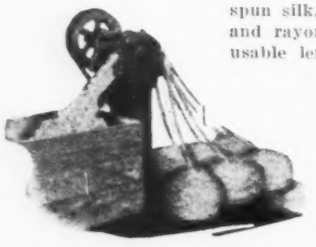
400-500 cuts per minute

FJS

Operating on the same principle as the Stokes Single-bladed Rotary Cutter but with doubled capacity. This cutter makes it possible to use your present standard machinery for mixed or 100% spinning, by cutting rayon, wool, ramie, flax, vicuna, spun silk, mohair, jute, combed silk and rayon waste, etc., into proper, usable lengths.



Makes 400-500 cuts per minute on 4 to 8 ends fed simultaneously.

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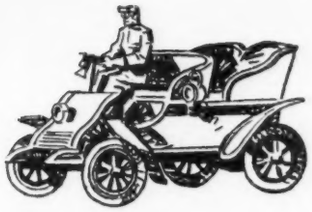
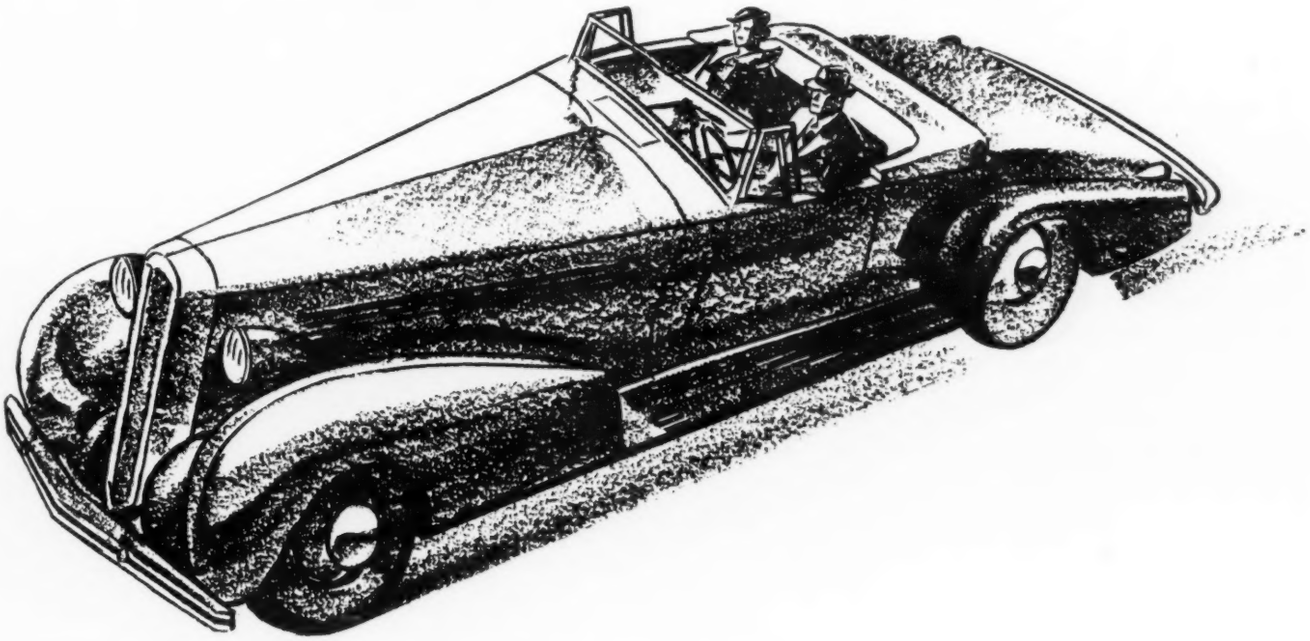


It took Individual Thinking 140 Years to Produce This

COLLECTIVE THINKING
Produced This in Only 27 Years



By the individual and isolated effort of scores of inventors over a period of about 140 years the automobile, by slow stages of development, finally reached the point when it was a practical method of transportation. Then the automobile industry discovered COLLECTIVE THINKING and its progress in the 27 years that have followed has been one of the marvels of the age.

Textile finishing can also utilize collective thinking with equally important results. In fact collective thinking is highly essential in textile finishing to-day because the multiplicity of problems created by new fibres and style changes require a breadth of knowledge and experience that is seldom given to one man or even to one organization. Furthermore, delivery requirements demand prompt solution of these problems.

Collective thinking in connection with sizing, printing and finishing problems is available even to the smallest textile unit through A-H Consultation Service. This service is rendered free of charge by a staff of especially trained chemists assisted by a completely equipped, modern laboratory and a company experience of 122 years.

Write and tell us your problem or ask our nearest representative to call.

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A-H CHEMICALS: Sizing and Finishing Gums and Compounds • Soluble Gums • Softeners • Soluble Oils • Tallow • Waxes • Soaps • Flour • Dextrines • Starches • Pigment Colors and Lakes • Ammonia • Acids • Blue Vitriol • Borax • Bichromate of Soda • Bichromate of Potash • Liquid Chlorine • Chloride of Lime • Caustic Soda (solid or flaked).

Maximum Belt Drive Economy
Greater Layout Flexibility

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MULTI-V-DRIVE
with
GOODYEAR
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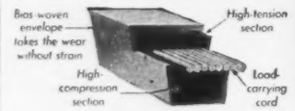

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- Advanced belt design
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25,000 STOCK COMBINATIONS
...UNLIMITED SPECIALS
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L A N E

Fig. 20

BASKETS, TRUCKS, SHIPPING HAMPERS
For
Cotton Mills, Woolen Mills,
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Smooth, Light Canvas-Containers
Have many unique advantages.

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Manufacturers Poughkeepsie, N. Y.

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Babbitt Crank Shafts are offered for practically all makes and sizes of looms. The Babbitt Process introduces nearly 50% more metal into the bends—strength where it's needed most.

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Frederick T. Walsh *Sidney A. Mathews*
will be at Southern Textile Exhibition, Greenville, South Carolina
APRIL 5–10, 1937
Booth No. 466

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Especially Useful for SHADING CHROME COLORS

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Combines Excellent Fastness to Light with Fastness to Fulling

These and its other fine qualities make it of interest for the dyeing of loose wool and tops as a self shade or in combination with **ALIZARINE LIGHT BROWN BL** for a variety of shades; both these colors may be dyed without chrome and yet are close to the fastness of chrome colors in wet finishing processes.

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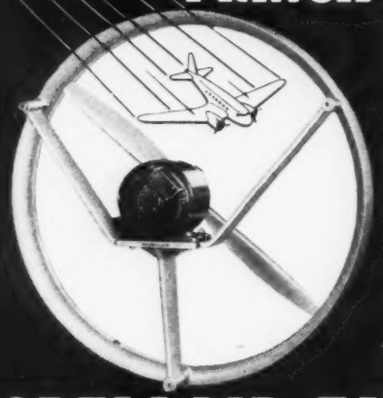

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SPINDLES

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THE FACTS—

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Reduction of friction to the minimum.

Powr-Savr Spindles are available for Cotton, Rayon, Silk, Woolen and Worsted mills. They cost no more than ordinary spindles.

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LAPPINGS AND BLANKETS
for calico, rayon, and silk machine printers.

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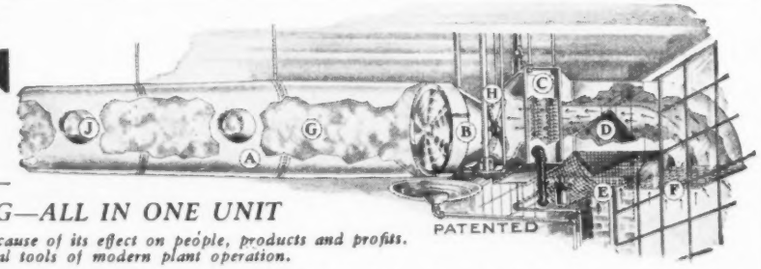
The Most Modern Equipment for the Textile Industry

THE BAHNSON HUMIDUCT

FOR HUMIDIFYING — HEATING — VENTILATING—AIR CONDITIONING—ALL IN ONE UNIT



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SEARCHLIGHT SECTION
TEXTILE WORLD ANNUAL

FEBRUARY, 1937

WHERE-TO-BUY

USED TEXTILE EQUIPMENT

PLANT AND MAINTENANCE SHOP EQUIPMENT
POWER GENERATING EQUIPMENT—ELECTRIC MOTORS
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EMPLOYMENT and other "OPPORTUNITY" advertising—see pages 238-C and 238-D

LOOKING AHEAD *in 1937*

Our organization is now better equipped to handle your business than ever before.

Mr. Walter L. Lowry, Textile Expert for many years identified with the Cotton Machinery and Mill Trade, has recently become associated with our organization.

His wide knowledge and experience now become available to our ever-increasing circle of friends and clients.

An organization—like good wine—improves with age, and this company, with many years of careful and conscientious service to all branches of the Textile Industry is no exception.

If you need a machine or a mill, we will welcome your inquiry and treat it with confidence. Should you have a mill or a machine for sale, we can place at your disposal a DOMESTIC AND FOREIGN MARKET which has been built up by this organization through years of friendly service.

COVERING THE ENTIRE TEXTILE FIELD

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COTTON • DYEING • FINISHING • KNITTING • RAYON • SILK • WOOL • WORSTED • COMPLETE MILLS

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1—Curtiss Steam Turbine KW 300, Speed 3600 Form C Steam Pressure 105 lbs. noncondensing with G.E. 550/3/60 A.C. Generator.

COTTON

2—Saco Lowell No. 4 Bale Breakers, 1925
1—H & B Bale Breaker
2—Saco Lowell Vertical Openers, screen sections—1917
2—40″ Kitson Single Process Pickers rebuilt by Saco Lowell in 1930
4—40″ Kitson Finisher Pickers
2—Saco Lowell No. 12 Lattice Openers
3—Whitin Machine Works 56″ large capacity Willow, 1921—Greenhalgh pattern with fan.
20—Whitin 45″ Cards, 27″ doffer, 12″ coilers
36—Deliveries Saco Lowell Drawing
2—Saco Lowell Slubbers, 12x6, 10¼″ gauge, 72 sp.
14—Saco-Pettee 10x5 Intermediates, 72 and 80 sp.
2—Woonsocket 8x3½ Intermediates 1919, 152 sp. each, 5¼″ ga.
4—Saco-Pettee 8x4 Speeders, 144 sp.
10—Saco-Pettee 8x4 Speeders, 120 sp.
2—Woonsocket Chain Dr. Speeders, 168 sp., 8x3½, 1920.
5—H & B Speeder 8x4, 156 sp.
11—Saco Lowell Tape Drive 240 sp. 1⅝″ and 1⅞″ ring metallic thread boards, filling builders, clutch sp., hank clocks, 1923, 2¾″ ga.
8—Saco Lowell 3¼″ ga. TAPE DRIVE 228 sp., 2″ ring
100—Whitin Spinning Frames, Band Drive, 3″ ga., 1912-1915, 50 with 336 sp. each, 50 with 312 sp. each
60—Saco-Pettee Band Drive Spinning, 256 sp., 2¾″ ga., 1912
60—Whitin Spinning Frames, 2¾″ ga., 1⅝″ and 1¾″ ring, 272 sp., Band Drive
20—Collins Twisters, tape drive 160 sp. ea. 1921, 3½″ vertical ring, 5″ ga., 6½″ traverse
12—Whitin Twisters TAPE DRIVE, 3¼″ ga., 1923
3—Fales & Jenckes Twisters, TAPE DRIVE, 3″ ga. 2″ ring, three ply creels, 1912, vertical ring for wet twist
2—Saco Lowell Slashers, 7′x5′ cylinders. 1919 to 1924
3—Warp Tying-In Machines, Barber Colman 4E, serial over 600
50—Draper E Model Looms, 36″ cloth, 41½″ Reed space, 2 harness, midget feelers, worm takeup, Roper let-off, 2 bank warp stop motion, 1920
60—Draper Model E 40″ Looms 45½″ Reed Space, 16 harness C&K double index dobbies, 2 bank stop motion, midget feelers, worm takeup, Roper let-off, Leno attachments, 1914
50—45½ Stafford 1x1 20H. Auto. Looms (1927)
50—48½ C & K 4x1 25H. Auto. Looms (1925)
10—64″ C & K 4x1 Cotton King, 20H. (1931-33)
45—Draper Model "E" 40″ Looms, 1914, belt drive, Lacey top, 2 bank stop motion
100—Draper Model "P" Looms, 64″ cloth, 69″ Reed space, 2 bank warp stop motion, friction let-off, worm takeup, some cam and some dobby
32—Draper Modified D Looms 40″ cloth, 45½″ Reed space, 1918 and 1926
90—Draper Modified D Looms 36″ cloth, 40½″ Reed space
6—90″ Stafford Automatic 100″ Reed space, feeler, 4 bank Regan stop motion, heavy Bartlett let-off, Lacey double tops, worm take-up
6—81″ Stafford Automatic Looms, 89″ Reed space, feeler, worm takeup, heavy Bartlett letoff, 2 bank warp stop motion, double top rolls
98—Draper E Model Looms, 52″ cloth

DYEING AND FINISHING

1—200 lb. Smith Drum hosiery dyeing machine
1—60″ Kettling and Braun decating machine
1—72″ Gessner decating machine
1—66″ Gessner Rotary cloth press
1—50″ Morrison Mangle with 5-can Morrison Dryer, all ball bearing with 4 sp. mtr. dr.
1—40″ Tolhurst extractor, monel basket
1—43″ Franklin 5 color printing machine
1—30″ Poland copper basket extractor
1—Cottage Steamer, 21′x8′
1—Hope Pantograph Machine, 46″ Rollers
1—Sketching Camera
1—44″ 4 box Washer & Mangle
1—4 box Open Soaper & Mangle
5—Jefferson Weedon Kiers, automatic control 8x10
2—3 bowl Water Mangles 46″
1—Set 15 Horizontal Copper Cans 30″x44″
1—Back Filling Range including Mangle, 9 Copper Cans 30″x44″
1—Butterworth 3 bowl Friction Calender 44″
4—Elliott Cloth Folders 40″

KNITTING

7—Acme boy's golf hose machines, 6 step, 3¼″, 120 n. to 4″ 160 n.
1—3½″ Standard Trump 160 n. 8 step
14—3½″ S & W HH 180 n. 25 spiral mock warp knitters
1—3½″ Banner Jacquard 200 n.
4—3½″ Standard Trump model H 200 n. 8 step
17—3½″ Banner, 220 n. 7 step stripers
12—3½″ Banner 220 n. stripper
12—3½″ Banner 240 n. striper
50—3¾″ Banner 220 n.
15—3¼″ S & W Mod. K 240 n.
45—3½″ S & W Mod. K 260 n.
30—3½″ S & W Mod. K 300 n.
15—3¾″ S & W Mod. K 260 n.

WANTED
a complete woolen mill, 10 to 15 sets.

SILK AND RAYON

250,000 Bakelite spools, heads 3″x3/16″, barrels 1½″, traverse 3½″, bore 5/16″—maple barrel
120,000 Bakelite spools, heads 2½″x3/16″, barrels 1¼″, traverse 3½″, Bore 5/16″, maple barrel
60,000 Bakelite heads and barrels, heads 2½″x3/16″, barrels 1¼″, traverse 3½″, bore 5/16″
150—54″ C & K Worcester 1x1 high speed silk looms, 20 harness, mtr. dr., warp stop motions
30—C & K 52″ looms, 2x1, serial nos. up to 11,861, 16 harness, double index dobbies, friction clutch pulley, center filling fork, 49″ cloth roll
6—C & K 45″ looms, 2x1, 20 harness, double index dobbies, friction clutch drive
12—C & K 52″ looms, 49″ cloth roll, 20 harness double index dobbie, friction clutch pulley, serial 8385 to 8581
4—Sip Winders, 72 sp.
2—Benjamin-Eastwood Silk Quillers, 40 sp. ea.
1—72″ Sipp Warper, low beamer, 768 sp. creel
1—Standard 54″ Inspecting and Measuring machine
1—Wales Adding Machine, 8 columns and fractions
50—C & K 1x1 automatic silk looms, 86″ motor driven
6—C & K 1x1 automatic silk looms, 54″ motor driven
40—C & K 1x1 auto. silk looms, 58″ motor driven
60—C & K 2x1 auto. silk looms, 54″ motor driven
40—No. 90 Universal Quillers overend D unrolling
20—Eastwood winders, single or double friction 80 to 118 spdls.
10—Atwood, double friction winders, 118 spdls.
20—Improved Eastwood warpers. 8 yards, 2200 yd. warp.
3—Hermas four knife silk picking machines, 58″ serials around B-1200
4—Silk folders

WOOLEN AND WORSTED

50—82″ C & K 4x4 looms 25 harness
5—2 spdl. Gill boxes, Prince, Smith and Lowell
2—dbl. can. Gill boxes, Prince, Smith and Lowell
2—Lowell single gill boxes, balling heads
2—4 spdl. draw boxes, Prince, Smith and Ramsden
3—6 spdl. draw boxes, Prince, Smith and Lowell
3—8 spdl. Saco-Lowell finisher boxes
2—150 spdl. Saco-Lowell 4 fold trap twisters, 3½″ rings
8—160n. 200 sp. Saco-Lowell Spinning Frames, 3½″ pitch
4—36 spdl. Saco-Lowell Roving Frames, 4x8 Bobbins
3—sets of Davis and Furber 60x60 worsted cards

DOMESTIC & EXPORT

MACHINERY LIQUIDATING CO., INC.

33 WEST 42nd ST., N. Y. CITY Cable Address "Liquidate" New York Bentley's Code **Tel. Penna. 6-8014**

Specializing in Mills, Machinery, Appraisals and Disposals for the Textile Industry

FOR SALE
Machinery and Equipment
of the
COLWELL WORSTED MILLS
Providence, R. I.

In Lots to Suit Purchaser

• • • • • •

WINDING & DRESSING ROOM DEPT.

2 Warp Compressing Spoolers, 32½" spool, 40 ends
2 Warp Compressing Spoolers, 40" spool, 40 ends
1 Davis & Furber 50 spindle Skein Yarn Reel
2 Foster 100 spindle Tube Winders, from skein
3 Universal No. 90 Winders
2 Davis & Furber Jack Winders, 80 & 120 spindles
2 Johnson & Bassett Jack Winders, 80 spindles
1 Collins 200 spindle Ring Twister, 3¼" gauge 2" ring, 6" traverse. Tape Drive. 2 sets of Rolls
1 Collins 200 spindle Ring Twister, 3" gauge 2" ring for 8" bobbin. Band Drive, 2 sets rolls.
3 Davis & Furber 82" Brass Plate Dresser Reels with spool racks, Hack Frames and Beamers.
5 Metal Drawing in Frames
1 Tillotson Yarn Steamer

YARN DYEING DEPARTMENT

1 Klauder-Weldon 8 stick Skein Yarn Dye Kettle
2 Klauder-Weldon 21 stick Skein Yarn Dye Kettles. Motor Drive.
2 Klauder-Weldon 50 stick Skein Yarn Dye Kettles. Motor Drive.
1 Broadbent 48" Extractor. Steam Driven
1 Tolhurst 48" Extractor. Belt Drive
2 Bailey 16 Arm Cool Air Skein Yarn Drying Reels

WEAVING DEPARTMENT

28 C. & K. 82" Heavy Worsted Looms, 4 x 4 box 25 harness
16 C. & K. 82" Intermediate Looms, 4 x 4 box 25 harness, Motor Drive
32 C. & K. 76" Intermediate Looms, 4 x 4 box 20 harness
Reeds, Harness Frames, Drop Wires, Heddles, Chain Stuff, Loom Parts, etc.

SPECIAL OFFERINGS

Not in above plant

24 C. & K. 82" Very Best Automatic Looms, 4x1 box, 25 harness. Motor Drive.
6 C. & K. 108" Automatic Blanket Looms, 4x1 box, 8 harness. Motor Drive.
16 C. & K. 96" Looms, 4x4 box, 25 harness. Motor Drive.
11 C. & K. 72" Looms, 4x4 box, 25 Harness Dobbies. Motor Drive.
16 C. & K. 92" Looms, 4x4 box, 30 Harness. Motor Drive.
40 C. & K. 82" Looms, 4x4 box, 25 Harness. Motor & Belt Drive.
1 Sargent Yarn Conditioning Machine.
2 Continuous Crabs, 4 Bowls, 66" rolls.
1 Parks & Woolson 60" Rolling & Measuring Machine.
1 Kenyon 2-section Cloth Dryer, 100 yards, out to 94".
1 Proctor 74" Loop Dryer with Reeves Drive.
1 Heathcote 20th Century Dryer, out to 73".
1 Klauder-Weldon 500 lbs. Raw Stock Dyeing Machine.
5 Tolhurst 48" Extractors. Copper Baskets.
2 Gessner 66" Double Cylinder Teasel Gigs.
1 Woonsocket 90" Double Acting Napper, 24 rolls.
2 Gessner 72" S. A. Nappers, 18 rolls.
2 Woonsocket S. A. Nappers, 12 rolls; 1—72" & 1—90".
1 Gessner 66" High Duty Rotary Steam Press.
1 Voelker 65" Rotary Steam Press. Model 1.
1 Parks & Woolson 66½" Model B Double Shear.
2 Parks & Woolson 2-cylinder Steamers.
2 Davis & Furber 92" Brass Plate Dresser Reels with Entwistle frame for high speed warping.
2 Logeman Hydraulic Baling Presses, 36"x56"x72", with oil tank & triple action pump. Motor Drive.
20 Foster Model 25—80 spindle Doubling Winders, 6" traverse.
17 Platt 40" Revolving Flat Cards.
20 Fales & Jenks 200 Spindle Ring Twisters, 3½" gauge, 2½" ring, 6" trav.

WET & DRY FINISHING DEPTS.

5 Portable Mill Sewing Machines
1 Merrow Sewing Machine 60 ABB. Motor Drive
1 Singer Numbering Machine. Motor Drive
3 Parks & Woolson Perches with Clock Dials
2 Fairbanks 80 yard Cloth Beam Scales
4 Steel Soap Tanks
2 Hunter 8 string Piece Dye Kettles. Motor drive.
2 Sample Piece Dye Kettles.
4 Hunter No. 10 Fulling Mills. Belt Drive.
2 Hunter No. 11 Fulling Mills. Belt Drive.
3 Hunter 8 string Washers. Motor Drive
1 Poland 2-section Rotary Laundry Washer
1 Voelker 66" Vacuum Extractor. Motor Drive
1 Birch Bros. 66" Scutcher or Opener. Motor Drive.
1 Curtis & Marble Doubling & Tacking Machine. Motor Drive
1 Heathcote 2-section Cloth Dryer, 80 yards capacity, out to 65" wide, with Schofield feeds. Motor Drive.
1 Voelker 66" Dewing Machine. Motor Drive
1 Voelker Steam Rotary Press 65". Motor Drive
1 Sjostrom 66" Conditioning & Cooling Machine
1 Parks & Woolson 66½" Model A Double Shear. Motor Drive.
1 Parks & Woolson 66½" 2-cylinder Steam Brush. Motor Drive
1 Parks & Woolson 66½" 4-cylinder Sanding & polishing Machine. Motor Drive.
1 Windle 6/4 Doubling, Winding & Measuring Machine. Motor Drive. Cloth Perches, Burling & Sewing Tables, Benches, Trucks, Scales, etc.
1 Emerson 1 Basket Conditioning Oven.
1 Suter Yarn Tester
4 Brown & Sharpe Yarn Reels, 36" & 54."
4 Brown & Sharpe Yarn Scales
1 Toledo Scale on wheels, 125 lbs. x 2 ozs.
1 Cincinnati Time Clock with boards.
1 Ideal Stencil Cutter, 1" Size.
Jack Spools, Bobbins, Belting, Pulleys, Shafting, etc.

Machinery of all kinds for Cotton, Woolen and Worsted Mills, too numerous to mention.

I buy and sell complete outfits from Raw Stock to Finished Goods. Advise me what you have for sale.

For Further Details, write, phone or telegraph

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Appraisals **146 SUMMER STREET** ***Liquidations***

Phone Liberty 0718. **BOSTON, MASS.** Established 1901.

Machine Shop and Warehouses, located at Andover, Mass.,—of approximately 150,000 square feet floor space.

Our Machine Shop is well equipped with modern tools. Specialize in gear cutting of all types and in rebuilding and modernizing textile machinery. All work guaranteed.

NOTICE: THIS IS ONLY A PARTIAL LIST OF OUR ACTUAL STOCK

We have on hand at all times a large supply of this type of machinery and equipment, including supplies.

FOR SALE

FRENCH WORSTED

2—Sets Societe Alsacienne French Drawing.
2—Sets Platt Bros. French Drawing.
24—Societe Alsacienne 650 spdl. x 1¾" ga. Mules.
24—Platt Bros. 650 spdl. x 1¾" ga. Mules.
14—Societe Alsacienne 400 spdl. x 75mm. ga. Ring Spinning Frames.
All in excellent condition. Will run each machine for inspection.

CARDING

1—Smith & Furbush 2-cyl. wstd. card 60 x 54.
2—Rich-Hartmann 60" Floor Grinders.
2—B.S. Roy 60" solid grinder rolls.
1—B.S. Roy 48" floor grinder with traverse wheel.
1—Dronsfield 72" reclothing machine complete with tension block.
4—D & F Coilers 14 x 36.

COMBING—In Stock

1—Taylor & Wordsworth Noble Comb. 65" rack. J. Smith dble. eccentric dabbing motion-offset. Reliance comb stop motion. Tillotson automatic feed knives. 1¼" inside and outside drawing off rolls. Circles, 28 large, 32 small. Coiler 12 x 36.
Gill Boxes—Fallers—Cans—etc.

FIBRE CANS—In Stock

130—Seamed—12 x 36
400—Seamed—11 x 36
100—Seamed—10 x 36
2000—Seamed— 6 x 33
55—NEW 14 x 24 Seamless

GILL BOXES—PREPARATORY—In Stock

4—P.S. & Saco-Lowell 7/16" p. sgl. baller. Year 1928.
2—P.S. sgl. head. dble. Baller ½" p.
12—H & S 7/16" p. sgl. Baller
1—T & W sgl. head dble. Baller, ½" p. (for backwasher)
1—P.S. dble head can gill 5/16" p.
4—P.S. sgl. head can gill ½" p.
1—T & W sgl. head can gill 7/16" p.
Fallers—Aprons—Gears—etc.

GILL BOXES—DRAWING—In Stock

10—P.S. sgl. head dble. can 7/16" p.
2—P.S. & L.M.S. sgl. head dble. can ⅜" p.
1—S.L. sgl. head dble. can 7/16" p., 1924.
2—H & S sgl. head dble. can ½" and 7/16" p.
1—P.S. dble head can gill ⅜" p.
1—P.S. dble head 2-spdl gill ⅜" p., 14x9
1—H & S dble head 2-spdl gill 7/16" p. 14 x 9
5—H & S sgl. head 2-spdl gill ½" and 7/16"p. 14x9
7—P.S. sgl. head 2-spdl gill ½" and 7/16" p. 14x9
1—S.L. sgl. head 2-spdl gill ⅜" p., 14x9
Fallers—Gears—Parts—Cans Creels—etc.

DRAW BOXES — all 4" low front roll—WORSTED—In Stock

2—H & S 4 spdle x 12½" p. 14x9
1—H & S 4x12½" p. 14x8
2—P.S. 4x12⅜" p. 14x9
1—H & S 12x9¼" p. 10x6
1—S.L. 10x9¼" p. 12x6
2—P.S. 8x9¼" p. 10x5
8—P.S. 12x8" p. 10x5
2—H & S 8x9¼" p. 10x5
Top rolls—Parts—Spools—Etc.

WORSTED REDUCING—In Stock

3—S.L. 12 spdle. x 7¼"p. 10x5 Flyer
1—S.L. 12x7¼"p. 9x5 Ring
2—P.S. 16x7¼"p. 9x5 Flyer
1—H & S 16x7¼"p. 9x5 Flyer
1—H & S 24x7¼"p. 9x5 Flyer

WORSTED ROVING—In Stock

4—H & S 24 spdl x 6"p. 4x8 Ring Rovers, 1922
2—H & S 24x6"p. 4x8 Flyer Rovers
4—H & S 32x5½"p. 6x3½ Flyer Rovers
4—S.L. 36x6"p. 4x7 Flyer Rovers, 1923
4—S.L. 36x6"p. 4x8 Flyer Rovers, 1923
23—S.L. & L. M. S. 36x5½"p. 6x3½ Flyer Rovers
7—S.L. 30x5½"p. 6x3½ Flyer Rovers
All S.L. and L. M. S. are Rabbeth Spdl. Gears—Spare Parts—Top Rolls Spools—etc.

WORSTED SPINNING—In Stock

6—Saco-Lowell 200 spdl. x 3½" p. x 5 ft. Cap spg. frames 3½" dia. l.f.r. Heavy builders. Year 1917-1921.
6—Hall and Stell 200 spdl.. x 3½" p. x 5' cap spg. frames, 4" dia. l.f.r.
10—Hall & Stell 180 spdl. x 3¾" p. x 5 ft. cap spg. frame, 4" dia. l.f.r.
1—Saco-Lowell 160 spdl. x 3½" p x 5 ft. cap spg. frame, 4" l.f.r. 1922.
4—H & S 144 spdl x 3½" p. x 5' cap spg. frames 4" dia. l.f.r.
5—Saco-Lowell heavy double builders for 5 ft. frames. Double lifters.
Caps—Tubes—Spindles—Gears—etc.

TWISTING—In Stock

3—H. & S. 192 spdl. x 3½" p. x 5 ft. cap trap dolly roll type, twisters.
9—Hall & Stell 168 spdl. x 4" pitch, x 5 ft. cap trap dolly roll type, twisters.
1—P.S. 160 spdle. x 3½" p. x 2½" Ring Twister, dolly roll type.
5—Ring changeovers, Saco-Lowell No. 1 2½" rings for 160 spdl. x 3½" p. frames.
1—Davis & Furber 60 spdl. x 3¾" ga. x 2½" ring Woolen twister. 1931.
1—F & J Novelty twister 28 spdl. x 3½" p. x 2½" ring
2—F & J 132 spdl. x 5½" ga. x 4½" ring Tape Drive.

WINDING

6—Foster Model 101 Cone Winders 80 spdl.
15—Foster Model 12 Cone Winders 100 spdl.
1—Foster Model 30 Cone Winders 100 spdl.
1—Foster Model 12 Tube Winder 80 spdl.
1—Foster Model 25 doubler 50 spdl.
2—Foster Model 25 doubler 100 spdl.
1—Uni. No. 60GF 68 spdl. x 6" traverse with equipment for paper tubes, wood tubes, or paper cones.
7—Uni. No. 90 winders for 8" bobbins. Bunch Builders. Serial 41,900 series.
35—Uni. No. 90 winders for paper copps. No Bunch Builders.

MULES—WOOLEN—In Stock

4—J & B 280 spdl. x 2¾" ga. for 14 spools of 20 ends each. 9½" bobbin. 1920 and 1925.

FINISHING MACHINERY—In Stock

1—P & W dble. shear Model A 66½" with list saving No. 4013.
1—P & W 72" semi decater with No. 2 Nash-Hyton pump No. 6947 (1929).
1—C & M 2-cyl. brush with folder 66½".
2—Yorkshire single bowl crabbs, 72".
2—Tillotson Swivel hand perches, 72" ceiling type.

EXTRACTORS—In Stock

1—King & Gerber 60" Motor Driven 550v. Rubber covered basket.
2—Tolhurst 48" motor driven Tinned Copper Baskets, safety covers. Automatic timing device.

PICKERS—WOOLEN AND WORSTED —In Stock

1—Sargent 48" Multiplex Burr Picker.
1—C & M 48" Parkhurst Burr Picker.
1—Atlas 48" Parkhurst Burr Picker.
1—Jenks 40" Mixing Picker.
1—Jenks 30" Mixing Picker.
1—D & F 36" Mixing Picker.
1—48" Picker Feed rebuilt.
1—36" Bramwell Picker Feed.
1—Sargent Model M 43" Picker Feed.

TAPE CONDENSERS—In Stock

1—D & F 4 banks sgle apron tape condenser for 120 ends and for waste ends complete with 36" doffer cyl. with No. 35 wire clothing. All complete for 60" D & F card. Year 1923. Excellent Condition.
1—D & F 2 bank 60" sgl. apron tape condenser for 48 ends. LIKE NEW

TRUCKS—In Stock

4—Metal Clad Fibre 60" l. x 36" w. x 29" d. inside.
20—Metal Clad Fibre 39" l. x 16" w. x 26" d. inside.
48—Metal Clad Fibre 38" l. x 19½" w. x 29" d. inside.

MOTORS – LEATHER BELTING – ETC. Always in Stock

We specialize in Worsted Yarn Machinery

FRANK G. W. McKITTRICK CO.

All machinery sales in charge of Mr. Bertrand A. McKittrick

60-64 FLETCHER STREET Telephone, Lowell 445 LOWELL, MASS.

NOW . . . RE-EQUIP AT THESE SENSATIONAL SAVINGS!

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All machines reconditioned and complete

★ *Low cost machines for high-profit production*

We offer a complete service to textile mills throughout every line of manufacture.

Because of our wide experience and thorough knowledge of the field both here and abroad, we can be of invaluable assistance in prompt and efficient liquidation.

A large stock of guaranteed rebuilt machinery is constantly maintained for your immediate needs. If you don't see what you want listed here, write us —we have more.

Should you have idle machinery taking up valuable space in your mill, tell us about it. We can dispose of it for you.

WRITE — WIRE
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Braiders

For All Uses

Insulated Wire Cords

Elastic and Non-Elastic Braids

Braided Cords of Every Description

Venetian Blind Cords

Sash Cord Braiders

Twisting and Spinning Machines for Cords, Novelties, Wire and Rope

American Insulating Machines

Ruff Machines

American Wire Company Twisters

Shoe Lace Tipping Machines

200,000 bobbins of every description

Winding Machines

60 Machines Sipp and National Mill Makes 72 to 100 spindles to a machine for Rayon and pure silk

Oswald Lever Bottle Winders all sizes for wood and paper bottles.

Foster Coners and Tubers

Universal Winders, all types.

Cotton Winders, all makes.

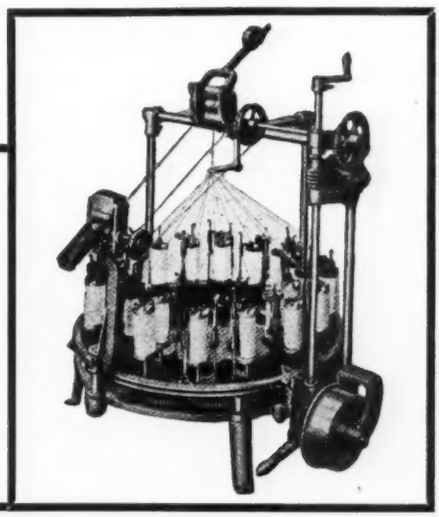
Knitting Machines

9—Supreme Make Flat Knitters 7 gauge, fully automatic, Jacquard machines.

9—Scott & Williams 4″ 100 Needle Circular Knitters.

Tisch & Eppler flat knitters.

20 Rachelle Knitters 18 and 24 gauge



ROBERT SOLOMON & COMPANY, INC.

Liquidators—Appraisers—Exporters

162 GREENE ST., N. Y. CITY

A Statement

TO BANKERS, TEXTILE PROCESSORS AND OTHER MANUFACTURERS, CONCERNING LIQUIDATIONS

Not only is "Consolidated" considered the country's largest purchaser of equipment—but we have an established national reputation as successful and rapid LIQUIDATORS of complete textile and other plants.

Our recent liquidation of The Passaic Print Works and The Lyons Piece Dye Works, are outstanding examples of our activities in this field. Other liquidations in the Industrial Field (listed here) speak for themselves. Our connections are nation-wide and our staff is thoroughly experienced.

We would be glad of the opportunity to consult with you in regard to your liquidation problems. We also wish to remind you that we have a large stock of equipment for sale, and solicit your inquiries.

Some of the Plants "Consolidated" Has Liquidated

SPRECKELS SUGAR CO.
LYONS PIECE DYE WORKS
WARREN DYE WORKS
CONSOLIDATED PIECE DYE WORKS
TURNER DYEING & FINISH CO.
NAPON RAYON CORP.
STAMFORD DYEWOOD CO.
MARX & RAWOLLE GLYCER. PLANT
AMERICAN HOMINY CO.
EASTMAN CHEMICAL CO.
NEW DEPARTURE REDUCTION CO.
W. VA. WASTEWOOD PRODUCTS CO.
WAYNE WOOD PRODUCTS CO.
PETROLEUM CHEMICAL CO.
GENERAL REDUCTION CHEMICAL CO.
ROSSMAN TILE CORP.
EMPIRE FLOOR & WALL TILE CO.
SAGINAW CHEMICAL CO.
ORGANIC SALT & ACID CO.
GEORGIA MANGANESE & IRON CO.
CAROLINA RAYON MILLS
PASSAIC PRINT WORKS
MAYFAIR PIECE DYE WORKS

Consolidated Products Co., Inc.
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Tel., Barclay 7-0600
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Liquidating Passaic Print Works

EXCELLENT MACHINERY,
EQUIPMENT,
OFFICE FURNITURE,
LAND AND BUILDINGS

2500 Copper Print Rollers
10 Printing machines 5 to 10 colors
3 Arlington Soapers
2 Arlington Grey Washers
10 Sets Dry Cans, Vertical and Horizontal
2 Textile Agers
6 Bleach House Sqeezers Mandrils
6 90′ Tenter Frames, clip and pin type
8 Calenders, Hydraulic, Schriener and Finishing
4 Woonsocket Nappers, 84"—36 and 20 Roll
10 Mangles and Padders
1 Tommy Dodd
4 Shears
2 Singers
1 Hydraulic Jack
4 No. 4 Reeves Drives

MISCELLANEOUS—Mycock Expanders, Foxwell Guides, Machine and Carpenter shop equipment, Pipe Cutting Machines, Engine Generators, Thermal Heating Units, Color Kettles, Flat Folders, Tubers, Boarders, Packing tables, Finishing Trucks, Automobile Trucks, Laboratory, New Tenter Clips, Office Furniture and Equipment, Engraving Mills and Dies, Pumps, Tanks, Blowers, etc.

Address inquiries on the above Liquidation to the

Consolidated Products Co., Inc.
At the Plant: 100 Fifth St., Passaic, N. J.

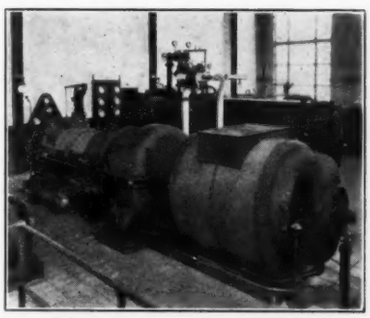
TELEPHONE: PASSAIC—2-0501

We Offer

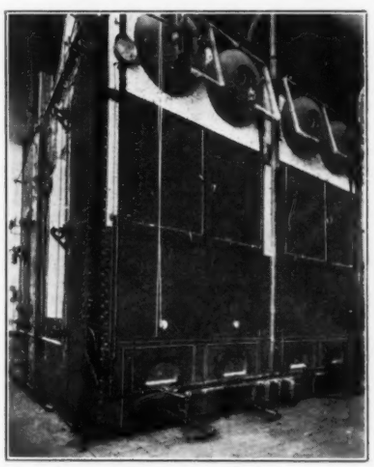
The Equipment of a Complete, Modern

Power Plant

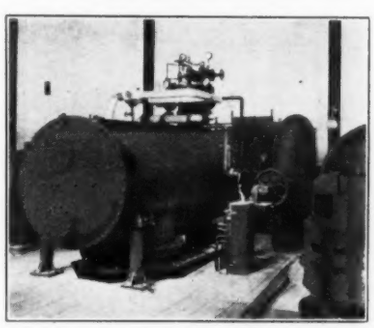
Just Purchased!



1000 KW G. E. TURBO GENERATOR



394 H.P. B & W BOILERS



5000 FT. SURFACE CONDENSER

Complete Plant Setup as operated. The equipment was only used for about 3 years and has been maintained in excellent condition. It consists of 3—1000 Kw. 19 stage G.E. TURBO Generators; 4 B & W 394 hp. WATER TUBE BOILERS; Surface condensers; 2—800 Synchronous Motors all complete with Switchboard and full auxiliary equipment. Not in years has there been such an opportunity to get what you need quickly—at reduced cost—in first class and efficient used equipment. Here is the list. Check it and select what you need AT ONCE for immediate shipment. Located in Bartow, Florida.

BOILERS

4—394 HP B&W Watertube Boilers—200 lb. working pressure on reerection. Each boiler equipped with B&W superheaters to give 135° F., soot Blower units, steam atomizing oil burners, and Feed Water Regulators including piping & valves.

FEED WATER HEATER

1 Feed Water Heater and Water Softener — Cochrane Corp. — Compartment - type combination; Cochrane Hot Process Water Softener; capacity 800 GPH raw water, and heating without softening, 5600 GPH condensate; complete, including sedimentation tank and double compartment heater with chemical proportioner, chemical solution tank, agitator and set of centrifugal chemical solution pumps with 3 HP motor, vertical sand filter.

2 Boiler Feed Pumps—10x7x12 Duplex; 225 lbs. steam pressure; 250 lbs. water pressure; capacity 270 GPM. Equipped with bronze liners, brass bushings, glands and boxes; 1-gal. 3-feed forced lubricator.

2 Oil Pumps—6x4x6 Duplex; 225 lbs. steam pressure; 200 lbs. oil pressure; capacity each—30 GPM. Equipped with brass plungers and valves. 1-gal. 3-feed forced lubricators.

1 Oil Filter—No. 40 type P.

1 Oil Heater — Schutte & Koerting—capacity 6100 lbs. heavy Mexican oil per hour. Good for steam and oil pressures up to 300 lbs. per sq.in.

TURBO GENERATORS

3—1000 KW Genl. Elec. Turbo-Generators — 1250 KVA 3600 RPM 2300 Volts 3 phase 60 cycle type M turbo alternators, designed for operation at 215 lbs. gauge steam pressure, 125° F. superheat, 2" absolute pressure. Will develop full 1250 KW at 1.0 P.F.

SURFACE CONDENSERS

2 Surface Condensers, C. H. Wheeler Mfg. Co.—Each condenser contains 5000 sq. ft. cooling surface. Each condenser has 2 F-11 Radojet Pumps air pumps with surface type inter-condensers; also hot well with 2" centrifugal type hot well pump with 7½ H.P. Terry turbines.

DUAL DRIVE EXCITERS

2—100 KW Gen. Elec. Dual Drive Exciters — 125 KVA 3600/1200 RPM 2300 V 3 ph. 60 cycle geared turbo alternators with 50 KW 125 V direct connected exciters. Units may be used either as turbo alternators, turbo-exciters motor-exciters or combination units for generation, excitation or heat balance purposes.

1 Switchboard, Genl. Elec.—18 panel 90" 3-section natural black slate switchboard.

We invite your immediate inquiries for this complete plant, for complete individual units or individual items. Write or wire at once.

SYNCHRONOUS MOTORS AND PUMPS

2—800 HP General Electric Synchronous Motors, type AT1 3 ph. 60 cy., 2300 v, 900 RPM, direct connected to Morris size 14C horizontal 3 stage centrifugal high pressure hydraulic mine pump.

1 Oil Burning System—No. 9 type B oil filter with 2½ x 1⅝ x 2" Simplet oil pump.

AIR WASHER

1 Webster Air Washer—Type G, Air Washer; capacity 20,000 C. ft. Air per minute; complete with centrifugal pump with direct connected electric motor and inter-connecting piping connections. Guaranteed to remove 98% of all solid matter from entering air, and cool same to not less than 90% of the wet bulb depression.

OVERHEAD CRANE

1 20-Ton Toledo Overhead Crane — 43' span, Toledo Bridge & Crane Co. Electric Traveling Crane.

MISCELLANEOUS

2 Oil Tanks—10,000 gal. capacity each; 8' diam; 26'8" long.

1 Venturi Meter—5"x1¾" Venturi tube with complete recording and registering meter. Working pressure 250 lbs. per sq. in.; for measuring boiler feed water up to 90,000 lbs. per hour.

Complete equipment of instrument transformers, relays, disconnecting switches, etc., of which complete specification can be furnished.

Consolidated Products Co., Inc.

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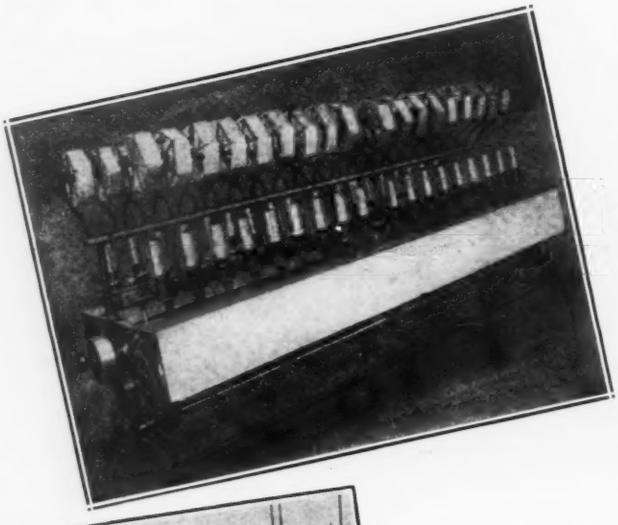

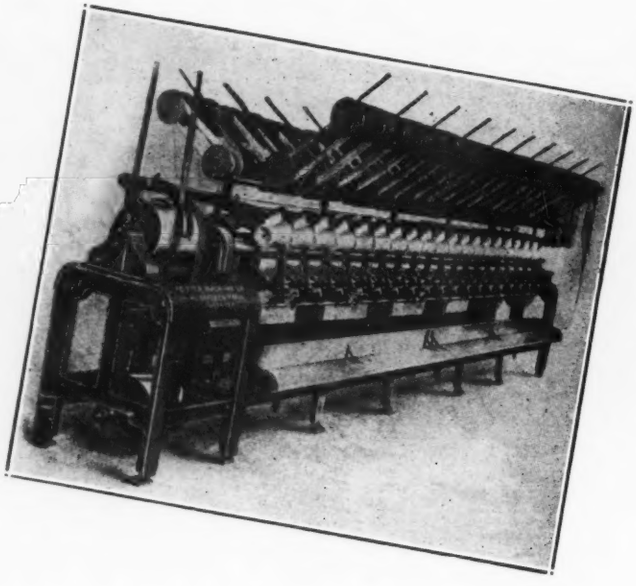

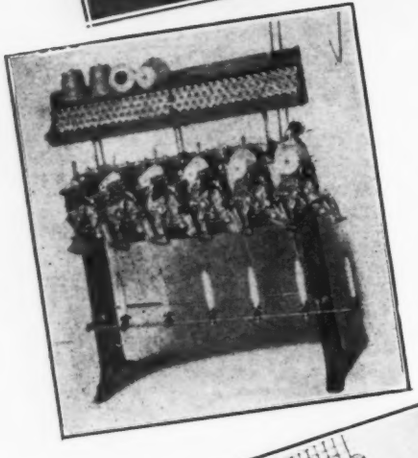

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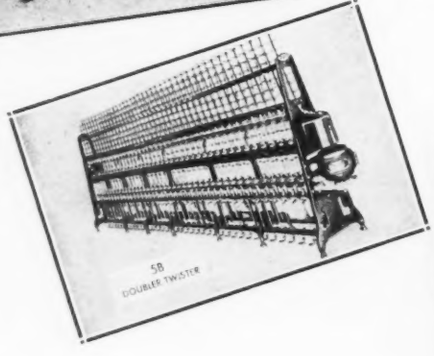

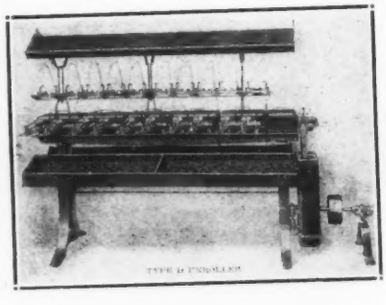

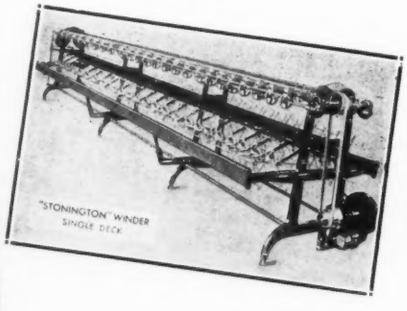

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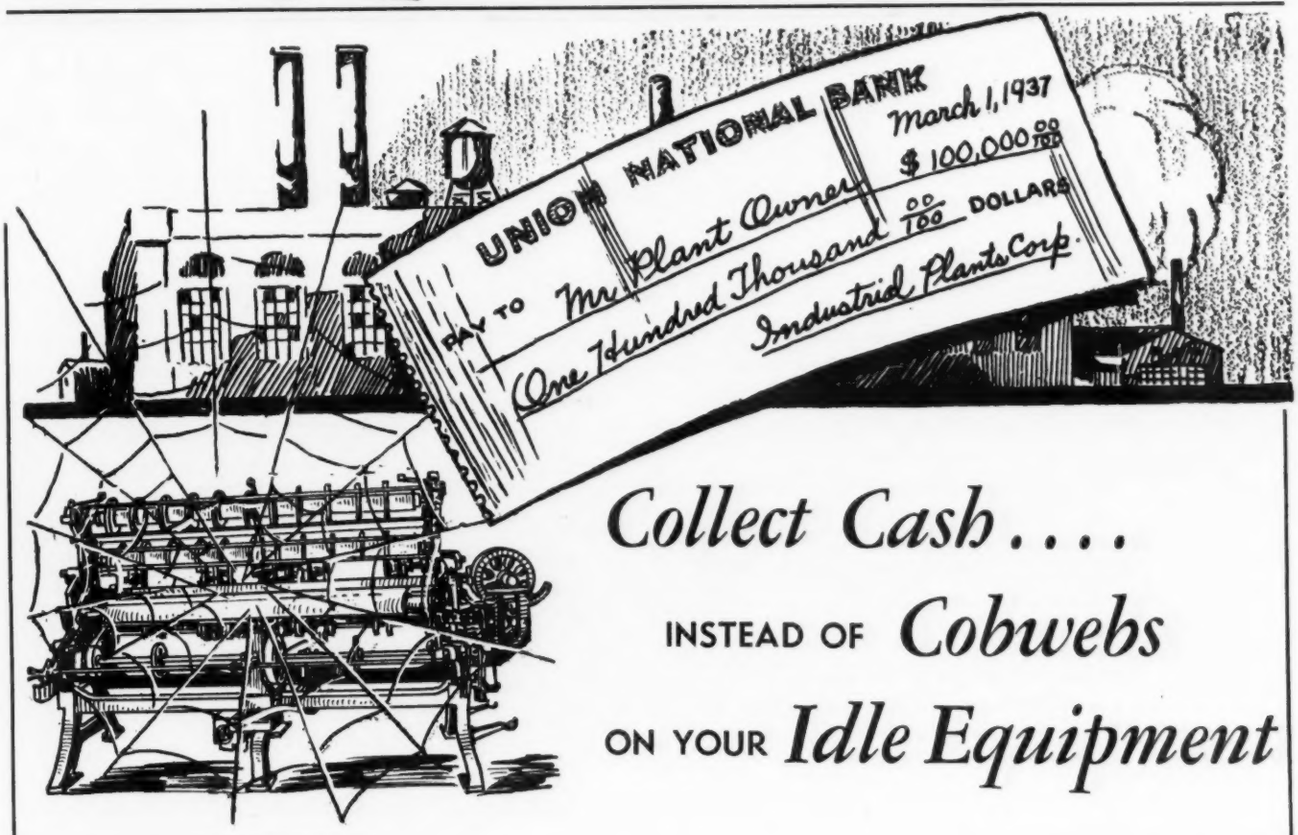

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2 x 1 - 4 x 1 - 4 x 4, late type in excellent shape, motorized or belt driven, dobby or gem head type.

Warpers, Winders, Quillers.

Jacquard machines, both fine and coarse index.

Electric Warp stop motions, Pick Counters.

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24" Grosser's, 8 gau aut.-Lamb and shaker and numerous flat knitters

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20—Crompton & Knowles Worcester, 4x1, 52″ looms, built in 1925, heavy girders, shock absorbers, roller bearing in dobby drive, motor driven complete with ½ HP motors, complete with 8 bank Rhode Island electric warp stop motion, and 4000 drops, feeler motion, Veeder-Root pick counter, high pickwheel looms, and complete with beam, weights, etc. at $75.00 ea.

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6—Sipp winders, 80-spindles each, oilless bearings, variable speed, motorized complete with motors.

6—Atwood winders, 80-spindles each, type 3F1, oilless bearings, complete with swifts and spindles, motorized complete with motors.

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Above machinery at equally low prices

Numerous accessories and supplies at very cheap prices. All prices quoted are mill floor, Kingsport, Tennessee. The above equipment is in perfect operating condition, and is ready for immediate use.

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41—Model D Draper looms suitable for Plush, 60″ cloth, motor drive
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1—70 Yd **Kenyon Tenter Chain dryer 74".** No housing, heating coils. Cloth or pile fabrics.
1—100 Yd **Butterworth pin chain dryer 72"** coils, feed and doffer, fans. (No housing.)
1—**Voelker rotary press, 72".** El Mtr. Dr.
1—60" K & B **German Dry Decating Mach.** winder, rolls, vacuum pump.
32—100" **Cam blanket looms** pairs R&L, belt dr.
12—92" 4x4 **Box looms,** jacquard heads.
H. M. SPECHT
118 E. 25th St., N. Y. C., N. Y. STuyesant 9-0951

FOR SALE
Bradford Spinning Plant
Complete; 1600 spindles; In best condition. Electric driven.
FS-767, Textile World
330 West 42nd Street, New York, N. Y.

FOR SALE
10 M Used 3¼x6 **Warper Spools**
30 M Used 4¼x5½ **Warper Spools**
200 M Used 8" **Automatic Wool Filling Bobbins**
250 M Used 8" **Automatic Cotton Filling Bobbins**
100 M Used 8" **Plain Wool Filling Bobbins**
FS-817, Textile World, 330 W. 42nd St., N. Y. C.

SHOP EQUIPMENT • ELECTRIC MOTORS • POWER EQUIPMENT

Air Compressors, 8½"x9" Worthington.
Air Compressors, 8"x8" "NSB" Chicago.
Boring Mill, 30" Bullard, Turret Hd, Thread Att.
Boring Mill, floor type, 6" spdls. Dbl. column.
Drill, Upright, 24" Aurora B.G., Tapping Att.
Grinder, Landis 30"x96", for M.D.
Grinder, D.E. US. 7½ HP. 3/60/220-440 V.
Hammer, Power, 50 & 100 lb. Little Giant.
Keyseater, No. 3 Mitts & Merrill, belted.
Keyseater, 24" Morton, 26x26" table, B.D.
Lathes 11" up to 42" in swing.
Milling Mach., #4 Ohio Plain, range: 72x30x20".
Pipe Machine, 4" Bignall & Keeler, gear box, M.D.
Planer, 48x48"x10' Gray, 3-heads, belted.
Press, Wheel, 60-Ton Watson-Stillman.
Saws, Hack, 4x4" Marvel; 6x6" Racine.
Shaper, 20" & 24" G&E., B.G., Belt & M.D.
Turret Lathe, 26"x4½"; 18"x3½" Libby., M.D.

MARR-GALBREATH MACHINERY CO.
55 Water St. Pittsburgh, Pa.

ELECTRICAL MACHINERY

Specialists in first class used modern steam turbo generator units, Uniflow engines direct connected to generators, motor generator sets, rotary converters and transformers.

Your inquiries solicited

UTILITIES ELECTRICAL MACHINERY CORP.
406 National City Bank Bldg., Cleveland, Ohio

HOWE BROTHERS
227 W. 34 St., New York City

Turbines, Generators, Engines, Motors, High Pressure Boilers, Transformers, Etc.

Send Us Your Inquiries

MACHINE TOOLS
NEW and USED

WEST PENN MACHINERY CO.
1210 House Bldg., Pittsburgh, Pa.

A. C. Engine Generator Sets
460 Kva.—G.E. 240 or 480 volt 3 ph. 60 cy. connected to Skinner Universal Una-Flow engine.
250 Kw. Allis-Chal. 80% P.F. 240 or 480 v. 3 ph. 60 cy. connected to Ames Unaflow engine.
110 Kva. Allis-Chal. 240 or 480 v. 3 ph. 60 cy. connected to Erie Ball simple engine.
Complete Stock of Motors, Generators and Transformers Rebuilt and Guaranteed
MOORHEAD-REITMEYER CO., INC.
Columbia Bldg. Pittsburgh, Pa.

TRANSFORMERS
Sales and Repair Service on Rewinding and Rebuilt Distribution, Potential, and Current Transformers; Write for our Transformer Rewinding Price Schedule; Satisfaction Guaranteed; NOTE: We are in the market to purchase at all times transformers of every description, burned out, odd voltages, all sizes and types; Send us a list of your offerings.
Philadelphia Transformer Co., Inc.
253 North Third St. **Phila., Pa.**

1000 GPM **Worthington Elec. Fire Pump.**
4—750 HP **Diesel Generator Outfits.**
746 ft. **I.R. Low Pres. Air Compressor.**
676 ft. **Worthington Duplex Air Compres.**
235 KW 250 V., DC **Winton Diesel Gen.**
24x24, 30x30 and 36x36 **Coal Crushers.**
1460 ft. Bury Elec. **Air Compressor.**
85 KW and 250 KW **Motor Generators.**

R. C. STANHOPE, INC.
875 Sixth Ave. **New York, N. Y.**

WE BUY AND SELL

Power Plants, D.C. and A.C. Motors, Generators, Transformers, Pumps and Elec. Instruments. Give us the opportunity of bidding. NOTE: We carry a diversified stock and your inquiries will receive immediate attention. Satisfaction guaranteed.

Superior Electric Machinery Co.
253 N. Third St. **Philadelphia, Pa.**

USED REEVES DRIVES USED
SAVE 50% OF NEW COSTS
All Sizes — Types — Ratios — #000 to #6
All Units Remanufactured (Like New) Guaranteed
SEND FOR OUR STOCK LISTS
SPEED REDUCERS—ALL SIZES—CONVEYING EQP'T.
We Buy Your Surplus Transmission
PATRON MILLWRIGHT & TRANSMISSION CO.
154 Grand St. **New York City**

Business
Property
Miscellaneous
For Sale

"OPPORTUNITIES"

Continued on page 238D

Shipping
Erecting
Dismantling
Wanted

A COTTON MILL IN THE SOUTH

An exceptional opportunity to acquire nucleus for larger plant in a 15,000 Spindle Yarn Mill. 60 acre mill village with modern welfare equipment.

Satisfied organization of native workers, small labor turnover.

Outstanding record of constant dividends for over twenty years.

Strong financial standing with no liabilities.

Location few miles from large city outside corporate limits. Satisfactory reasons for selling.

Address: OPPORTUNITY
Care—Columbus Bank & Trust Co.
Columbus, Ga.

DISMANTLING SHIPPING ERECTING

ALL KINDS OF TEXTILE MACHINERY EXPERTLY HANDLED
Domestic & Foreign Shipments.

JOSEPH M. LASSONDE

LIST BUILDING, FALL RIVER, MASS.
P. O. Box 256. PHONES 806 and 2439

WANTED

Yarns, Seconds, Remnants, Etc.

For equipment wanted ads see following page

DANVILLE, VIRGINIA

FACTORY—FOR SALE OR RENT

Mill construction—modern—70 by 120 feet.
Four floors—sprinklered throughout.
Office, stairway, elevator and boiler room detached.
33,600 square feet.
Good labor available.

PATTON, TEMPLE & WILLIAMSON, INC.
Danville, Virginia.

Bleachers & Printers

ATTENTION

It will pay you to investigate how you can get better prices for your pounds, seconds and remnants.

We sell to export, all goods that may conflict with the first quality of your customers

Write now to

W. 849, Textile World
330 W. 42nd St., New York, N. Y.

Used Textile Equipment For Sale

See advertisements pages 228 to 238-C inclusive and page 227 for classified index of equipment advertised.

If you do not find the equipment wanted listed, write the advertisers or the

Departmental Staff

TEXTILE WORLD
330 W. 42nd St., New York, N. Y.

FACTORY BUILDING FOR SALE or RENT

Two story and basement, brick construction, open all sides; built for silk throwing mill. Town of 10,000 on B & O and Pennsylvania Railroads.

Reasonable assistance given manufacturers desiring branch or new location. Address
Board of Trade, Punxsutawney, Pa.

Reliable K. M. & M. S. Co.
H. W. HARLEY, Agt.
between 6th & 7th Sts., Philadelphia, Pa. U. S. A.
Hosiery, Underwear and Textile Machinery
Also Dye House Machinery.

YARNS WANTED

We buy all your surplus **YARNS**—look over your **YARN** stock—turn your surplus into **CASH**—no quantities too large or too small to handle—send full particulars today.

WAVERLY YARN CO., Dept. T
5 Waverly Place, New York, N. Y.
Gramercy 7-4519

SEARCHLIGHT SECTION

MACHINERY, MILL SUPPLIES, YARNS, ETC., WANTED AND FOR SALE
BUSINESS OPPORTUNITIES, MILL PROPERTIES, POSITIONS AND MEN WANTED

UNDISPLAYED—RATE PER WORD:

Positions Vacant and all other classifications 10 cents a word, minimum charge $2.00.

Positions Wanted (full or part-time salaried employment only) ½ the above rates, payable in advance.

(See ¶ on Box Numbers.)

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch $6.00
2 to 3 inches..... 5.75 an inch
4 to 7 inches..... 5.50 an inch

Other spaces and contract rates on request.

An inch is measured vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS MUST BE RECEIVED BY MARCH 5TH TO APPEAR IN THE MARCH ISSUE T.W.

POSITIONS VACANT

WANTED—Manufacturer has position open with opportunity for two or three capable Wilton Designers. P-845, Textile World, 330 West 42d Street, New York City.

ASBESTOS TEXTILE — Superintendent for preparation, carding and mule spinning room. For consideration state age, experience and salary expected. Our men know of this ad. P-846, Textile World, 520 No. Michigan Ave., Chicago, Ill.

POSITIONS WANTED

NARROW fabrics. Position wanted as manager, superintendent; thorough practical, technical knowledge yarn to finished web; styler, designer; non-elastic, elastic, wide looms, elastic knitting, braiding. PW-825, Textile World, 330 West 42nd Street, New York City.

EXPERIENCED TEXTILE MAN offers following qualifications for position. Detailed accurate costs and controls at minimum expense. Time study and rate fixing. Labor saving and profit making devises and methods. Buyer. Selling experience. Government orders. Testing and research. Stoppage of gratuities and other leaks. Executive. Age 36. Eleven years' experience. Decided asset to any progressive firm. PW-844, Textile World, 330 West 42d Street, New York City.

WOOLEN MILL EXECUTIVE, Superintendent. Asst. Superintendent. General overseer 18 years manufacturing experience men's, boys' wear dress goods Ski cloth Meltons 13 years well known mill thorough knowledge making shoddies, blending stocks, carding, spinning, dressing, weaving, finishing, designing. If your mill is idle or a liability can secure profitable business. PW-852, Textile World, 330 West 42nd Street, New York City.

BOSS DYER & FINISHER available; one dept or both; eminently capable; experienced on all classes of dying and finishing cotton, woolen and silk. Fidelity Service, 77 Summer St., Boston.

BUSINESS OPPORTUNITY

EXECUTIVE with complete knowledge and experience in manufacture of Glazed Wadding, desires to contact firm that will finance and help organize plant making such product. BO-847, Textile World, 330 West 42d Street, New York City.

WANTED

ANYTHING within reason that is wanted in the field served by Textile World can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

(POSITION WANTED)

MANUFACTURING EXECUTIVE

Executive, engineer and salesman—has been associated with several large manufacturers as plant manager, development engineer for textile machinery, and sales engineer. Graduate of textile school and school of technology. Proven ability and best of references.

PW-843, Textile World
330 W. 42d St., New York City

PATENT YOUR IDEAS REGISTER YOUR TRADE-MARK BY Z. H. POLACHEK 1234 BROADWAY 31st NEW YORK

REG. PATENT ATTORNEY PROF. ENGINEER
SEND SKETCH or MODEL for CONFIDENTIAL ADVICE
No Charge for Consultation

Over Forty Years of Dependable and Confidential

EMPLOYMENT SERVICE

for textile mills, converters and selling houses requiring managers, superintendents, stylers, designers, salesmen, overseers, second hands, fixers, etc.

'Phone, wire or write us your personnel requirements.

CHARLES P. RAYMOND SERVICE, Inc.

Phone: Liberty 6547 **294 Washington Street, Boston, Mass.**

WOOL COMMISSION SPINNING

Six card set Mill in Michigan in excellent condition. Now running on warp yarns for auto upholstery. Have own dyehouse and garnetting. Will quote on commission spinning.

BO-848, Textile World, 520 No. Michigan Ave., Chicago, Ill.

Why Worry About Wool Costs

Modern Woolen Mill, Extraordinary, Complete equipment; all processes; Wide box looms, versatile output; can make variety goods, wool substitutes; wants temporary financial assistance, or active moneyed partner. Mill running profitably. Big profitable business now available men's wear; automobile; or women's wear fields.

BO-850, Textile World
330 West 42d Street, New York City

Complete Velour & Plush Mill

Offers unusual return for financial aid additional working capital needed temporary loan—high degree of protection enormous profitable business lined up; low cost production; Plant equipment versatile; Partnership active or silent.

BO-851, Textile World
330 West 42nd St., New York City

FOR SALE

USED TEXTILE EQUIPMENT

See pages 227 to 238-C

MILLS — FACTORIES

See page 238-C

WANTED

—EQUIPMENT
See advertisements below
—YARNS, SECONDS, ETC.
See preceding page (238-C)

WANTED

Silent Chain Drive, chain 6", Pinion 19 tooth, Sprocket 49 tooth, 1¼ Pitch 42" Center.

PERKASIE SILK MILLS
Perkasie, Pa.

WANTED

Full Automatic Spooler for Winding Small Wooden Spools

State condition, price, etc.

W-842, Textile World
520 No. Michigan Ave., Chicago, Ill.

WE BUY USED ELECTRICAL EQUIPMENT

A.C. and D.C. Motors, Generators, Transformers, Circuit Breakers, Meters, etc. Send Us a List of Your Idle or Surplus Electrical Equipment.

THE FUERST-FRIEDMAN COMPANY
E. 45th St. & Hamilton Ave., Cleveland, O.

WILL BUY

OLD LEATHER BELTING

WHAT HAVE YOU

SEGAL & ROTHMAN, INC.

144 N. Third St. Phila., Pa.

THE BETTER YOUR QUALITY THE GREATER THE NEED *for* TOLHURSTS

IN the dye house . . . in the bleachery . . . in the carbonizing room . . . in the finishing department . . . at every step in textile manufacturing, the country's finest mills depend on Tolhursts to safeguard their quality.

Whether your process calls for extracting, impregnating or degumming —put your problems up to Tolhurst. Tolhurst extractors are made in every type, every size, every material. And back of every machine is more than eighty years of specialization in building extractors for the textile industry. Write . . . ask a Tolhurst engineer call on you.

GENTLE UNIFORM EXTRACTION KEEPS STANDARD HIGH

In this new Tolhurst "Center Slung" you get complete freedom from vibration. You get quick, easy loading and unloading. You get low operating costs and trouble-free performance.

The "Center Slung" case is steel welded with entire case, basket and bearing assemblies suspended by steel chain links. Basket is made of corrosion resistant material, balanced statically and dynamically and mounted so that it cannot strike against the case.

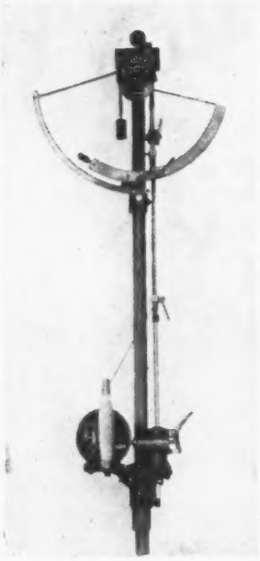
External, contracting friction band brake; cast aluminum, safety-interlocked cover; fully enclosed spindle and bearing assembly; single point bearing lubrication—these are additional features which makes the "Center Slung" the extractor you should own.

TOLHURST CENTRIFUGAL DIVISION
American Machine and Metals, Inc.
100 SIXTH AVENUE • NEW YORK, N. Y.

Green Island	7328 Hamilton Blvd.	2231 So. Parkway	1st National Bank Bldg.
Troy, N. Y.	Detroit, Mich.	Chicago, Ill.	Atlanta, Ga.

SCOTT TESTER

Model X-5—for Single Yarn Tests



Available in double capacities

0 to 2 pounds and 0 to 10 pounds
0 to 2 pounds and 0 to 20 pounds
0 to 5 pounds and 0 to 15 pounds
0 to 5 pounds and 0 to 20 pounds
0 to 300 grams and 0 to 1000 grams
0 to 1000 grams and 0 to 5 kilograms
0 to 3 kilograms and 0 to 6 kilograms

Stretch Readings in English, or Metric Units.

Motor Driven
(direct connected motors)

Stands from floor
(no installation expense)

Price $165.00

HENRY L. SCOTT CO.

Providence, R. I.

BARNES TEXTILE ASSOCIATES

CONSULTING ENGINEERS
TO
THE TEXTILE INDUSTRY
FOR
OVER 25 YEARS

OPERATING METHODS
MECHANICAL SURVEYS
COST METHODS
PRACTICAL BUDGETS
CREATIVE COUNSEL
SPECIAL PROBLEMS

10 HIGH STREET, BOSTON, MASS.
PHONE - LIBERTY 1407

Faster . . . Better . . .
CLOTH WINDING

Save time, cut out re-winds in the cloth room. 40" to 75" winding machine with 100 yard indicator. Indicator geared to winding bar, never in contact with material, but records every move of the machine. Handles light or heavy cloth, straight or bias. Write for bulletin.

FABRIC MACHINE CO.
310 Center Street
Bridgeport, Conn.

Fully 25% of All Cotton Textile Spindles in the U. S. are Operated on the Loper System

Ralph E. Loper Co.

INDUSTRIAL ENGINEERS
Specialists in Textile Costs Over 23 Years
FALL RIVER, MASS. GREENVILLE, S. C.

PREVENT WASTE

WITH WAYNE SEPARATORS

Laminated Bakelite or Hard Aluminum Separators with brackets to fit all machines. Rugged. Quickly removable for cleaning. Ask for prices and information on these and other Wayne money-saving textile specialties.

WAYNE MFG. CO. *HONESDALE, PA.*

MURDOCK Bobbin Holders

Our latest patterned holder is built with heavy lugs with a cup washer which gives greater strength for holding automatic bobbins.

Automatic Bobbin also the Regular Filling Bobbin having 1 3/16 inch head. If you are using automatic bobbins write for sample.

Write us regarding all matters pertaining to bobbin holders, as we make many kinds, and are sure we can be of help to you.

MURDOCK & GEB CO., Franklin, Mass.
Manufacturers of Bobbin Holders for Over Thirty Years

"Look it up first"

in the TEXTILE WORLD YEARBOOK and CATALOG

In the Catalog Sections . . .

WHENEVER you need details on equipment or supplies . . . whenever you need information on companies or products . . . "look it up first" in your 1936 Textile World Yearbook and Catalog.

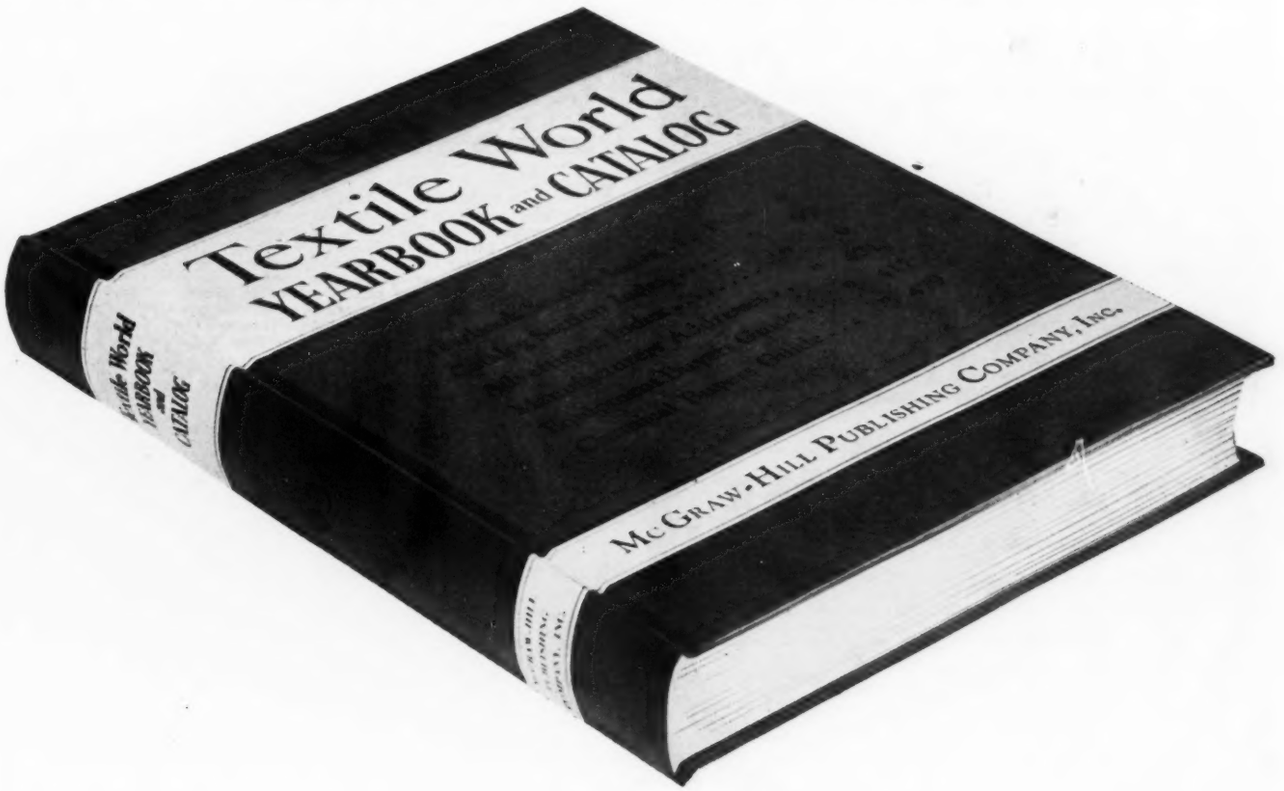
In this one *complete* volume you will find a classified directory of manufacturers of material, machinery and supplies used in textile mills—an equipment buyers guide, a chemical buyers guide—and almost 300 pages of manufacturers' catalogs giving detailed information about their products.

Whatever you need "look it up first" in the Textile World Yearbook and Catalog.

In the Data Sections . . .

WHENEVER you need technical information about mill operation or maintenance, whether it be *general* data applicable to all textile mills, or *specific* data for the guidance of cotton men; wool men; silk and rayon men; or dyeing, bleaching and finishing men you will find the answers in the 75 pages of your 1936 Textile World Yearbook and Catalog, devoted to Mill Reference Data.

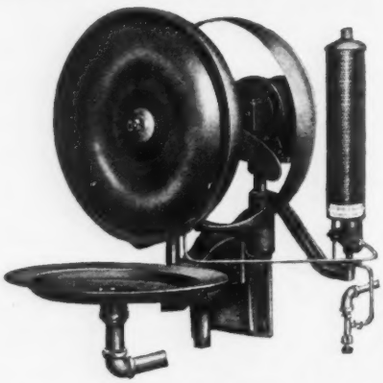
Whatever your problem, "look it up first" in this authoritative compilation of useful data presented for your convenience by the Editors of Textile World.



"The Bluebook with the Orange Band"

NEW!

SOUTHWORTH
MODEL D HUMIDIFIER



MODEL D.
Patented. U.S. Serial No. 2,060,258

You can maintain proper regain and overcome static troubles with the NEW Southworth Model D Humidifier. Advanced engineering coupled with exhaustive testing makes this an extremely well-balanced, quiet and durable unit. It retains all the best features of our popular previous models with improvements added to make it more reliable and efficient. Write.

THE SOUTHWORTH MACHINE CO.
PORTLAND MAINE

The
MODERN TWENTIETH CENTURY
and the
HORIZONTAL STREAM-FLOW DRYERS

TODAY'S PRODUCTS

- Heathcote Tentering and Drying Machines
- Housings
- Ventilating and Circulating Fans
- Textile Combs of all description, including:
- Comb Circles
- Mazzetti Patent Circles
- Steel Fallers
- Flax and Silk Gills
- Tentering Pin Plates
- Porcupines
- Steel Circle Plows
- Roller Cover Clamps

are designed for

Speed

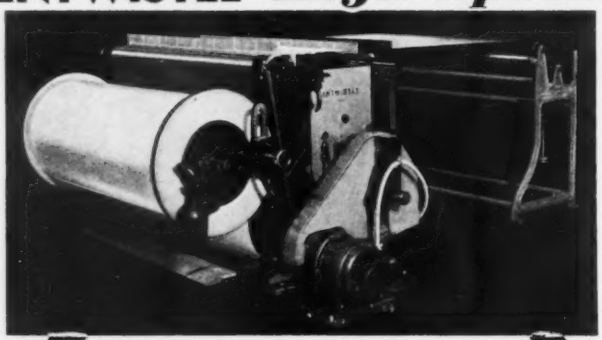
Economy

Dependability

Have you seen them?

WILLIAM MILLER CO.
Established 1870
PROVIDENCE RHODE ISLAND
America's Pioneer Circle Makers

ENTWISTLE *High Speed*



RAYON BEAM WARPER
for profitable, carefree output

A new machine, designed to meet the new conditions in this growing field. Has received overwhelming approval of scores of mills. All adjustments can be made on outside. Electrical stop motion. Adaptable to any make Creel. Vibrator motion for ends minimizes wear on comb dents. S.K.F. Ball Bearing. Whitney Silent Chain and Sprockets—no gears. Efficient Braking. Many other special features, the result of months of research and actual field operations.

Write for more complete details or have our representative call.

T.C. ENTWISTLE CO.
LOWELL, MASSACHUSETTS
Southern Representative: L. E. Wooten 913 First Nat. Bk. Bldg. Charlotte, N. C.

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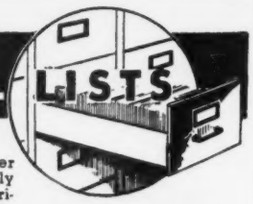
DIRECT MAIL LISTS



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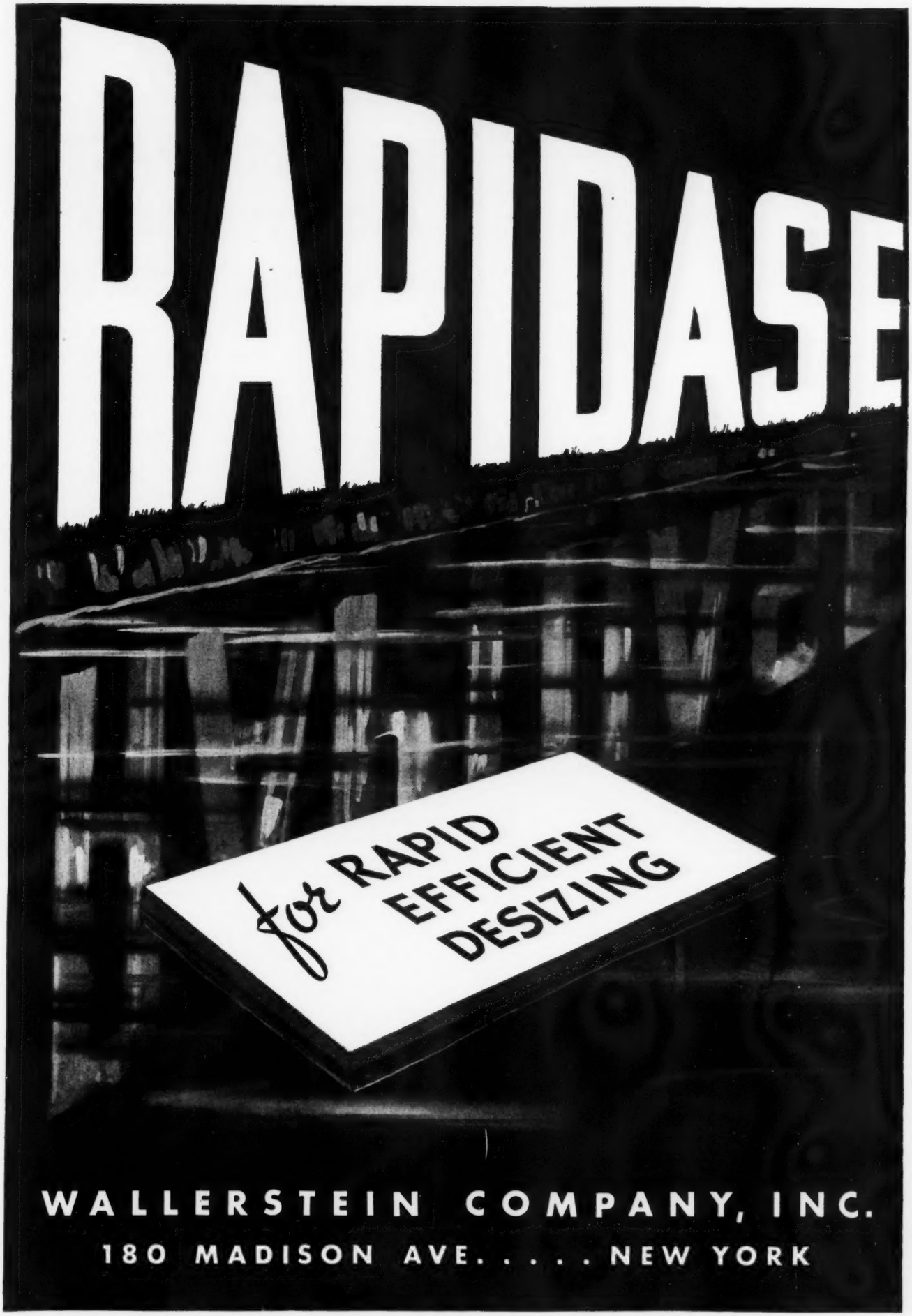
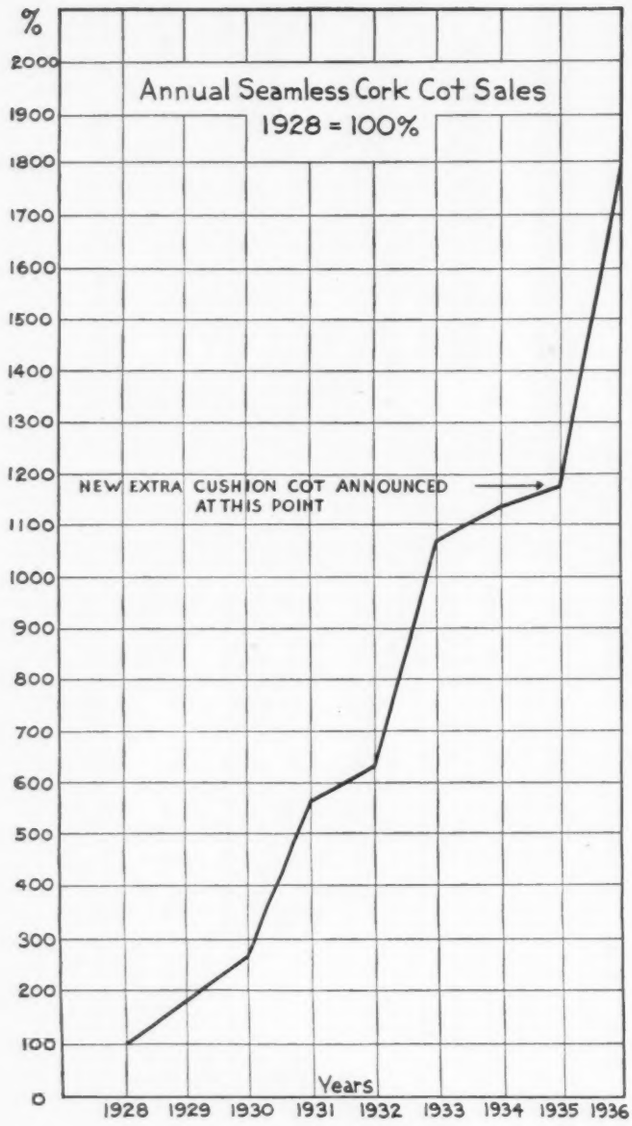
330 W. 42nd STREET NEW YORK, N. Y.

. . . COMPLETE LISTS COVERING INDUSTRY'S MAJOR MARKETS


RAPIDASE
for RAPID EFFICIENT DESIZING
WALLERSTEIN COMPANY, INC.
180 MADISON AVE. . . . . NEW YORK

"Let's look at the record..."



1. *Each year since 1928, more Armstrong's Cork Cots have been purchased by the Textile Industry.*

2. *Even during the depression, sales continued to rise.*

3. *As business conditions improved, sales increased at an accelerated rate.*

4. *Today, the industry is buying more than seventeen times as many Armstrong Cots as in 1928.*

5. *Sales for the year following the introduction of Armstrong's* Extra Cushion *Cot have risen phenomenally—the highest in the Company's history. What better proof of the widespread acceptance of cork as a roll covering material?*

HERE ARE THE FACTS ABOUT THE USE OF ARMSTRONG'S CORK COTS

TODAY, more than 6,000,000 "active" spindles are equipped with Armstrong's Seamless Cork Cots. That's more than twenty-five per cent of the "active" spindles in all the mills in the country. And these cots are spinning a range of numbers from 2s to 140s. In addition, they have proved a real boon to those mills spinning rayon staple and novelty yarns made of rayon staple, wool, and cotton.

An ever-increasing number of mills buying new spinning are specifying, "—to be equipped with Armstrong's Seamless Cork Cots." During one twelve-month period, Armstrong's Cork was specified as original equipment on 173,040 spindles of new spinning and on another 301,000 spindles of long draft change-overs. Machinery manufacturers have adopted these cots as standard equipment on their new long draft drawing and roving frames.

About a year ago, a new *improved* cork roll covering —Armstrong's *Extra Cushion* Seamless Cork Cot— was introduced. With this cot, we predicted a banner year for cork. Our most optimistic prediction became a reality. Armstrong's Extra Cushion Seamless Cork Cot boosted the sales of cork as a roll covering material to a record, all-time high.

The reasons behind this phenomenal rise in the use of cork for spinning are found in the material itself. Armstrong's Cork Cots are seamless, uniform, have a true and concentric finish, and spin a high quality yarn. They give a long life of economy and performance.

Any Armstrong representative will be glad to show you detailed figures supporting each of the statements made above. Ask him about the new improved Armstrong roll covering material, the Extra Cushion Cork Cot, made by the exclusive *tubular* process. Get all the facts about the extra advantages it offers—in fewer roll changes, less rebuffing, longer life, and stronger, more uniform yarn. See how, in many cases, it has cut roll covering costs fifty per cent and more. Learn how Armstrong's Seamless Cork Cots can help in spinning *your* type of yarn! For complete information and samples, call your nearest Armstrong representative or write to one of the offices listed below.

Armstrong Cork Products Company

Textile Division - 924 Arch Street

BOSTON, MASS. **LANCASTER, PA.** **GREENVILLE, S. C.**

ARMSTRONG HAS MADE CORK PRODUCTS SINCE 1860

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An * indicates more complete data will be found in 1936 Textile World Yearbook and Catalog.

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